

July 16, 1968

H. W. HENN

3,392,617

PUNCH ASSEMBLY FOR PERFORATING MATERIALS

Filed March 2, 1966

5 Sheets-Sheet 1

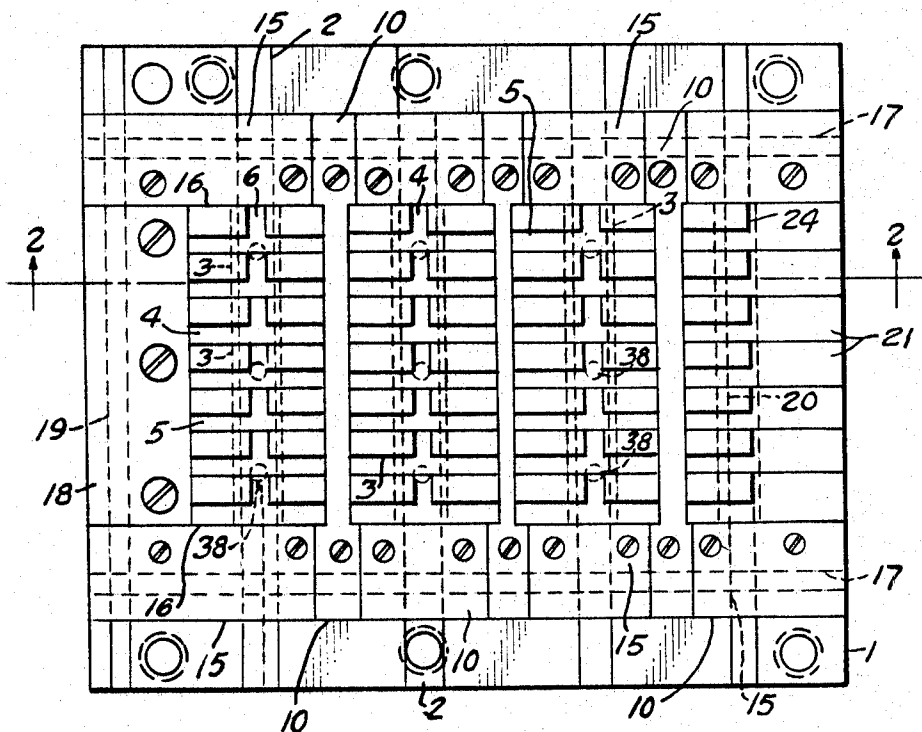
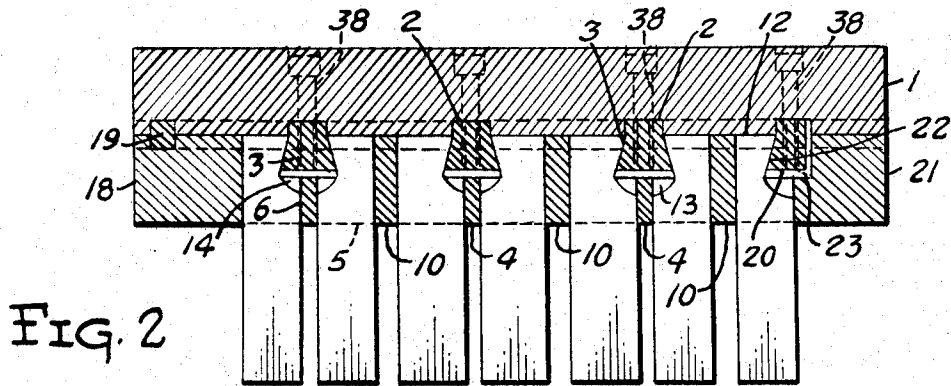


FIG. 1

INVENTOR.

HARRY WALTHER HENN

July 16, 1968

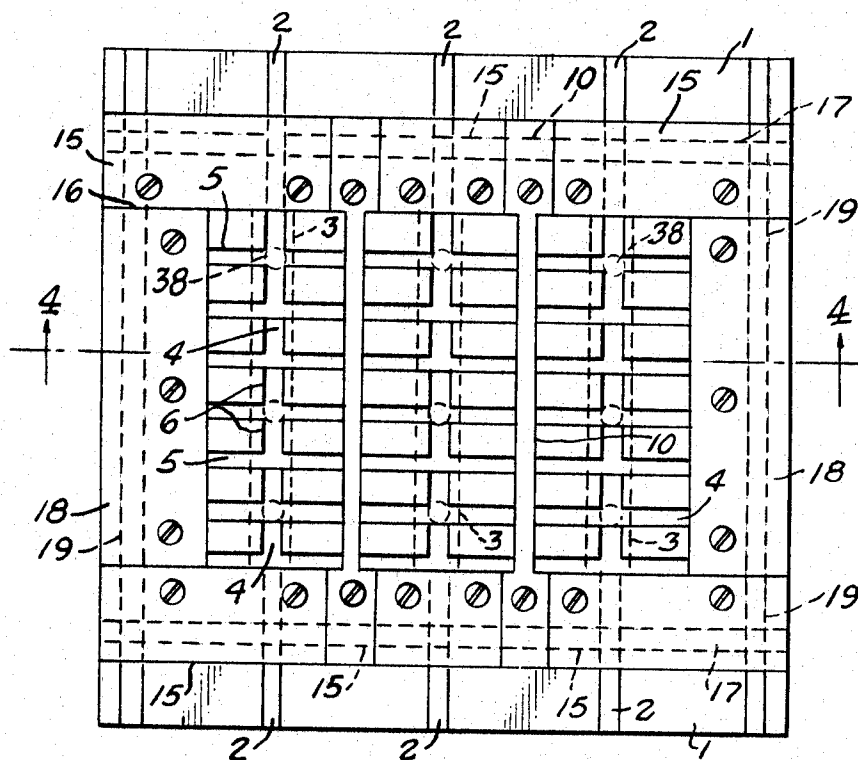
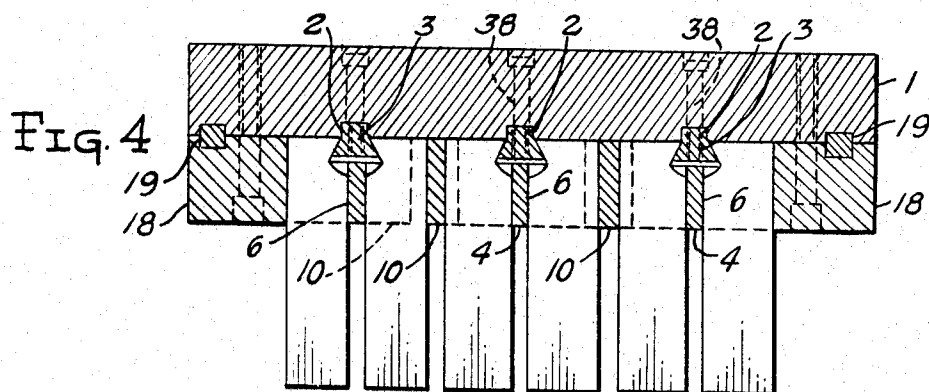
H. W. HENN

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INVENTOR.
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FIG. 5

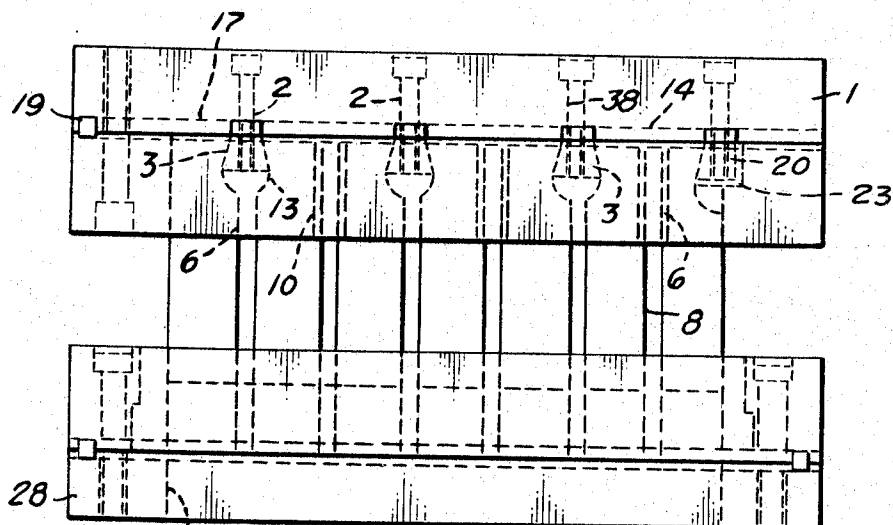
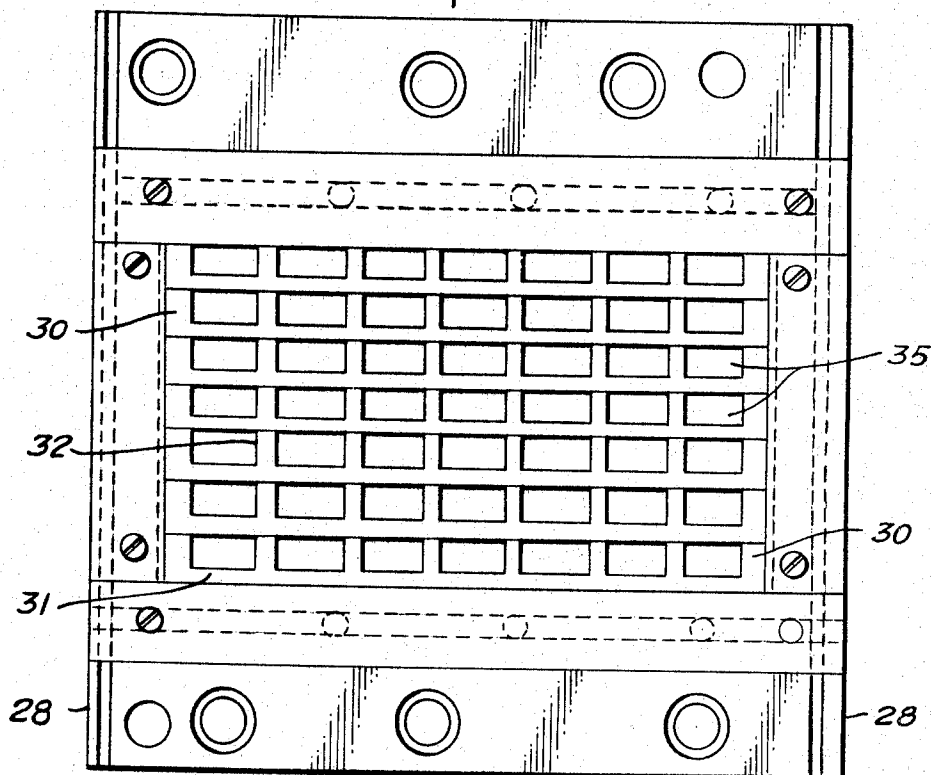


FIG. 6

INVENTOR.
HARRY WALTHER HENN

July 16, 1968

H. W. HENN

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PUNCH ASSEMBLY FOR PERFORATING MATERIALS

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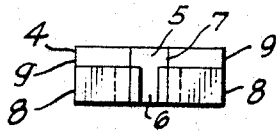


FIG. 8

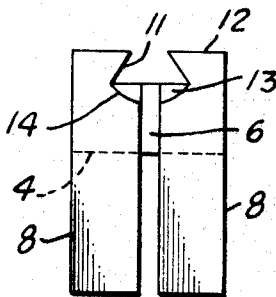


FIG. 9

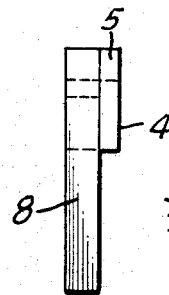


FIG. 10

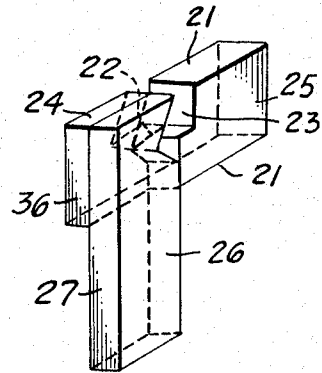


FIG. 11

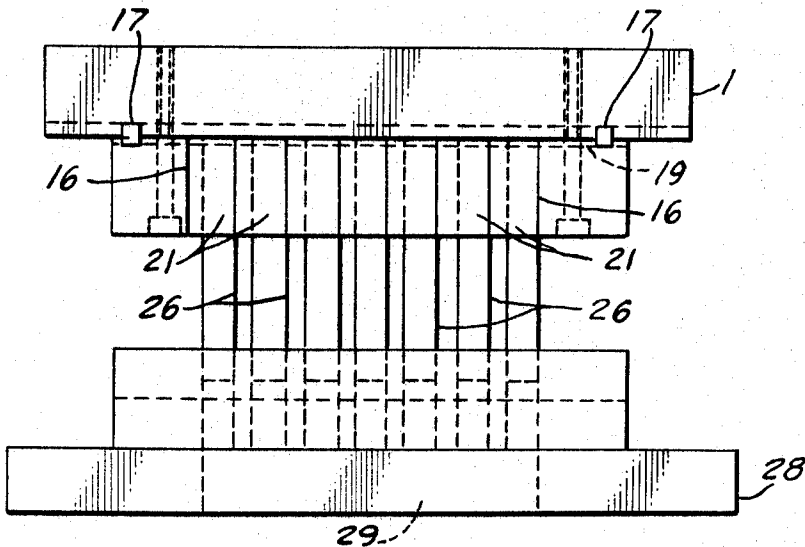


FIG. 7

INVENTOR.
HARRY WALTHER HENN

July 16, 1968

H. W. HENN

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FIG. 12

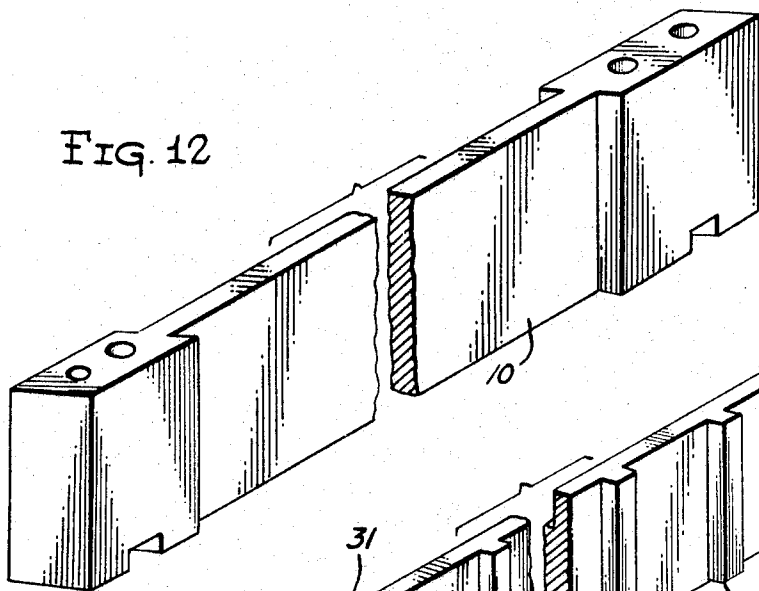


FIG. 13

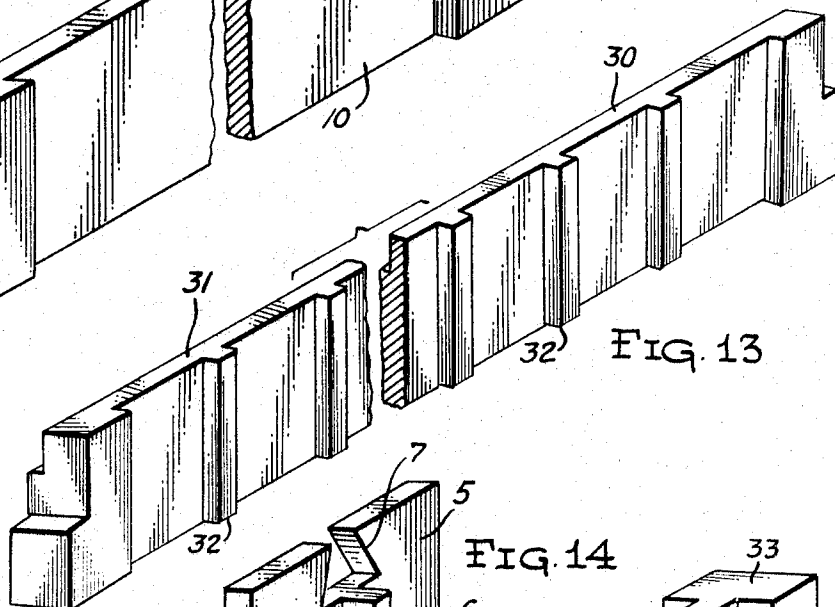


FIG. 14

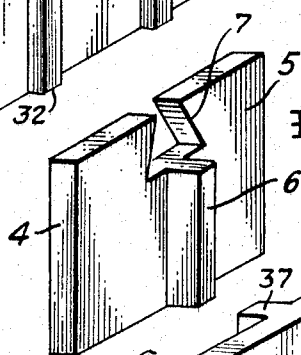


FIG. 15

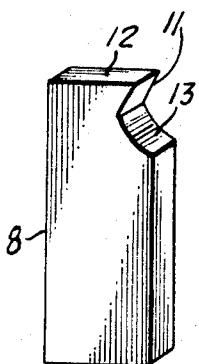
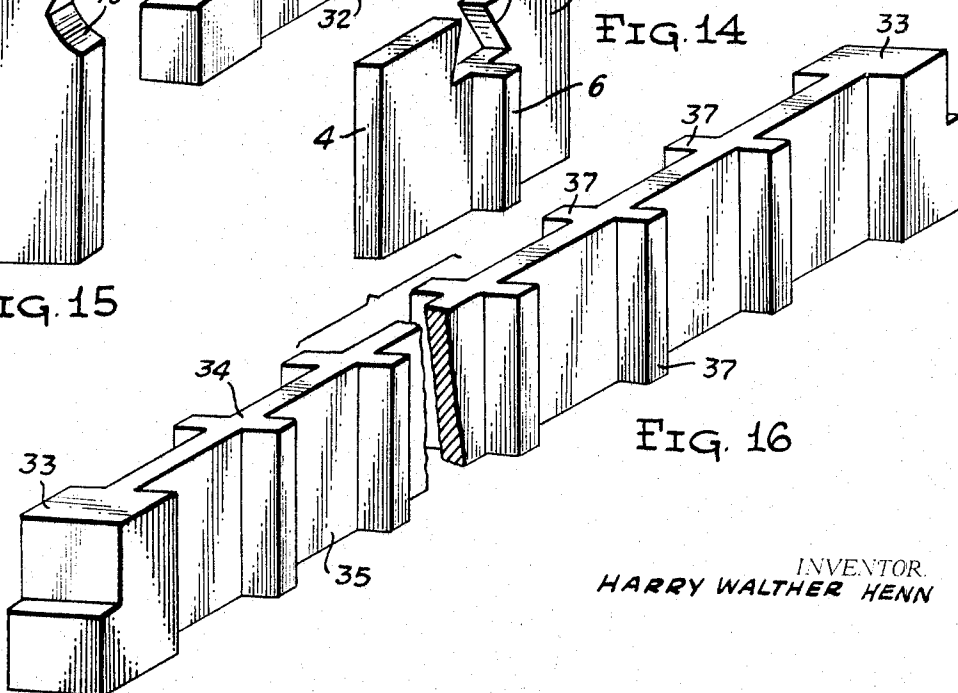


FIG. 16



INVENTOR
HARRY WALTHER HENN

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3,392,617

PUNCH ASSEMBLY FOR PERFORATING MATERIALS

Harry Walther Henn, 9925 Daly Road,
Cincinnati, Ohio 45231

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9 Claims. (Cl. 83-687)

ABSTRACT OF THE DISCLOSURE

This application discloses a punch assembly for perforating materials in which a series of openings are pierced at close spacing in multiple rows laterally and longitudinally and in which punches are mounted in the punch assembly to be carried by a punch press in removable rows for insertion or removal of individual punches or rows of punches without disturbing adjacent individual or rows of punches.

This invention relates to a punching device for perforating materials, and more particularly to the construction of the punch assembly which is adapted for use in any piercing operation by which a series of openings are arranged in very close spacing in multiple rows, both laterally and longitudinally, that can be punched simultaneously and prevent the distortion of the material between the openings.

The primary object of my invention is to provide a punch assembly with punches arranged in rows laterally and longitudinally that permits the removal or insertion of any row of punches, or a single punch, without disturbing or disassembling any other rows of punches or any other punch in a particular row.

Another object of my invention is to provide a punch assembly with punches arranged in odd number of rows laterally and/or longitudinally, whereby the entire odd row of punches may be removed without disturbing or disassembling any other rows of punches and a single punch can be removed from the odd rows of punches without disturbing or removing other punches in the odd row.

A further object of my invention is to provide a combination of rows of punches and spacers for the punches whereby the means securing the spacers in the punch assembly also secure rows of punches in spaced relationship in the punch assembly and permit the removal of a punch or punches without disturbing the position of other punches.

The distinctive object of my invention is to provide spacers adapted to fix the lateral spacing of the punches and clamp the punches, arranged either in single or paired rows that are slidable during assembly, on the means for securing the spacers and punches in fixed operative position within the punch assembly and allow selected punches to be removed or replaced from a row without disturbing the position of other punches in a row or adjacent rows.

These and other objects will be made apparent by the specifications and drawings forming part of this application.

In the drawings, similar parts in the several views have been given the same reference numerals.

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FIGURE 1 is a plan view of my punch assembly having an odd row of punches in both directions.

FIGURE 2 is a section through the punch assembly having an odd row of punches in both directions taken on line 2-2 of FIGURE 1.

FIGURE 3 is a top plan view of a punch assembly having an even number of rows laterally and an odd row longitudinally.

FIGURE 4 is a section through the punch assembly taken on line 4-4 of FIGURE 3.

FIGURE 5 is a top plan view of a die assembly having odd rows of punches in both directions.

FIGURE 6 is a side elevation of the punch and die assemblies having odd rows in both directions with the punches down into the dies.

FIGURE 7 is an end elevation of the punch and die assemblies with the punches down into the dies.

FIGURE 8 is a top plan view of a T shaped spacer and two punches assembled together.

FIGURE 9 is a front elevation of the T shaped spacer and two punches assembled together.

FIGURE 10 is a side elevation of the T shaped spacer and one of the punches assembled together.

FIGURE 11 is an isometric view of a spacer for an odd row of punches with a punch assembled on the spacer.

FIGURE 12 is an isometric view of a keeper block for spacers and punches.

FIGURE 13 is an isometric view of a die steel for rectangular openings broken to indicate its use for odd or even spacing of punches.

FIGURE 14 is an isometric view of a T shaped spacer for a pair of punches.

FIGURE 15 is an isometric view of a punch.

FIGURE 16 is an isometric view of a die steel for openings having irregular or rounded contours broken to indicate its use for odd or even spacing of punches.

Referring to FIGURES 1 through 7, there is illustrated a backup plate 1 for mounting of the punch assembly and securing it to a punch press. Crosswise of the backup plate there are key slots 2 in which dovetail keys 3 are removably fixed. The dovetail keys are for rows of paired punches. T shaped spacers 4 have slabs 5 and extending ribs 6 and dovetail slots 7 (see FIGURE 14) for fixedly retaining them on the dovetail key 3 and also slidably retaining them on the dovetail key during assembly and disassembly of a row of punches.

Referring to FIGURE 8, it should be noted that ends 8 of the punches extend micromatically beyond 9 of the slabs 5 of the T shaped spacers which insures maximum clamping of the punches on a particular dovetail key when a keeper block 10 is placed between a row of paired punches. There is a T shaped spacer for each pair of punches, and the slabs 5, in conjunction with the ribs 6, fix the space between punches longitudinally on the dovetail key and the ribs, also space the punches sidewise in each pair. The punches are illustrated as being rectangular in shape but it is not intended to limit my invention to this configuration. Any shape on the tip of the punch can be used. The punches need not be identical in dimension or contour, even when arranged in pairs on a particular spacer. The keeper blocks 10 extend across and are removably fixed between each double row of punches. Fixed in place, the keeper blocks wedge against the ends 8 of the punches thereby forcing and securing the punches in

fixed crosswise position in the punch assembly on the dovetail key. In addition, the dovetail keys are adapted to be drawn upward by the screws 38 securing them in the backup plate and insuring clamping of the punch between the keeper block, backup plate and dovetail key. The keeper blocks may be rectangular in shape, as illustrated, or have sloping sides with matching sloping sides on the punches and spacers for greater wedging action.

Corresponding to the angle of the dovetail key, there is a bevel 11 at a top 12 of the punches making full wedging contact and secure clamping of the punches on the dovetail key when the keeper blocks and the dovetail keys are secured on the backup plate between a row of punches by appropriate screws. The keeper blocks force and hold the punches on the keys and in turn the keys force the top 12 of the punch solidly in contact and fixed on the backup plate which absorbs the force of the piercing during a punching operation and also keeps the punch secured on the upward returned stroke. A curved surface 13 provides a fillet for strength and clearance 14 on the punch to prevent interference to clamping of the punches on the key because of the width of the key when the punches are clamped onto a key. There are illustrated end caps 15, spaced and fixed on the backup plate at the ends of a row of paired punches in the punch assembly between the ends of the keeper blocks 10. The construction is used when the punches are closely spaced and no room is available for screws to hold the keeper in place. When the punches are spaced further apart, the keeper blocks will be wider for fastening screws, and the ends of the keeper blocks will terminate at the end blocks. Vertical sides 16 of the end caps provide a fixed length between them for a row of punches and spacers. The pressure between the punches and spacers in a row between the end blocks provides a sliding fit and when the keeper blocks are removed from between rows of punches any single punch can be removed and replaced without disturbing any other punches in a row. The space between each pair of punches longitudinally is fixed by the thickness of the slab in combination with the ribs of the T shaped spacers.

The end caps, and the keeper blocks, are held in alignment and removably fixed on the backup plate by square keys 17 secured in slots in the backup plate. Spaced and fixed between the end caps 15 there are side caps 18 at right angles to the end caps on the sides of the punch assembly having an even number of rows of paired punches which are held in alignment on other keys 19 that are removably secured in the backup plate for an even number of rows. When there is an odd row, the key adjacent to the odd row is omitted (to be explained). The side caps provide a vertical abutment for the outside rows of punches and spacers and hold them in alignment in relation to the dovetail key. To remove a punch from the outside row, the screws for securing the side caps are turned to move the side cap down from the backup plate thereby releasing the pressure between the side cap and the bevel on the punch from the respective dovetail key and space combination. When the side cap is loosened from the backup plate anyone of the punches in the outside row can be removed without disturbing any other punch in the row. The removal of a punch is accomplished by tipping the punch and sliding it out from between the spacers and away from the dovetail key.

The side caps and end caps are secured to the backup plate by appropriate screws and together they form an absolute internal measured frame around the outer edges of the T shaped spacers and punches to hold them fixed in proper location and insure positive location of pierced openings in the materials being punched.

Referring to FIGURES 1, 2 and 11, there is a half dovetail key 20 that is removably secured in a slot in the backup plate. This key is for a single or odd row of punches. There is a spacer 21 for each punch. The spacer has a bevel 22 corresponding to the bevel on the punch and dovetail key and a clearance pocket 23. A recessed

portion 24 is provided and corresponds to the width and depth of the punch. When the punch is placed in the recess of the spacer the side 25 of the spacer is flush with the side 26 of the punch. An end 27 of the punch extends micromatically beyond an edge 36 of the spacer. The keeper bar, secured in the backup plate, wedges the punch and spacer securely on the half dovetail key. With this construction there is no need for a side block to keep the end row of punches securely in operable position.

The die consists of a backup plate 28 with internal opening 29 through which slugs are discharged after punching. Conventional die steel members 30 are machined to suit the contour of the punches, which in this case is rectangular in form, as shown in FIGURE 13, wherein a transverse body portion 31 has spaced ribs 32. They are fixed to the backup plate with their respective cavities aligned with the punches. The transverse body portion of adjacent steels are placed against the ribs of another steel to form and complete rectangular cutting edges aligned with the punches. With punches having irregular or rounded contours, die steel members 33 are arranged with ribs 37 on both sides of a transverse body portion 34 and cavities 35 machined to conform with the contour of the punches. The ribs of these die steels are butted together to form the complete die cavity and cutting edges.

Assembly of the punches is accomplished by securing the square keys 14 and 16 in the backup plate. End and side caps are secured on the backup plate a distance apart. The paired punches, with their spacers, are then slid on the dovetail keys which are movably secured in the backup plate until a particular row of punches has the required number of punches. After forming adjacent rows of paired punches, a keeper block is inserted between them which forces the punches and spacers into wedged position on the dovetail keys. Additional wedging is obtained by drawing the dovetail keys upward with the screws that hold the dovetail key in fixed position in the backup plate. To remove any punch from rows of paired punches, the keeper block between the rows is removed from between them which releases the wedging action on the punches. The punches can then be rotated away from the dovetail key and easily removed without disturbing any other punches.

An outside or odd row of punches are formed by assembling a single punch in the recess of the spacer. The punch and spacer are positioned on the half dovetail key. A keeper block is secured on the backup plate on adjacent and odd row of punches. The keeper block forces the punches, along with its spacers, onto the half dovetail key and secures them in operable position in the punch assembly. When the keeper block is removed, any punch in the odd row can be removed without disturbing any other punches in the odd row of punches or any other rows of punches in the assembly.

Having thus described my invention I claim:

1. A multiple punch assembly for stamping a series of laterally and longitudinally spaced rows of holes simultaneously and in which punches are mounted in the punch assembly in removable rows for insertion and removal of individual and rows of punches without disturbing adjacent punches comprising,

a punch holder for said punch assembly, said punch holder adapted to be mounted in a punch press, a back-up plate forming part of said punch assembly, dovetail keys means spaced, disposed and secured on the under surface of the backup plate and adapted to be adjusted up and down in relation to the backup plate,

a series of paired punches mounted in said punch holder the upper end of each of said punches having a half key slot for detachably securing said pair of punches on said dovetail keys and the lower surface of said backup plate, each of said punches adapted to be individually removed from any one of said dovetail keys without disturbing matching or adjacent punches,

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spacers having ribs to space a pair of said punches laterally aside said ribs along said dovetail keys and other pairs of punches adjacent and longitudinal of said keys spaced longitudinally by said spacers, said spacers having a dovetail keyway for removably securing said spacers on said dovetail key and the underside of said backup plate and adapted to be removed and inserted without disturbing other spacers and punches spaced on said dovetail keys, and removable end caps adjacent to the ends of said spaced punches to secure said punches from longitudinal movement along said dovetail keys and secure said punches in a predetermined fixed position adjacent each to the other in said multiple punch assembly.

2. A multiple punch assembly for stamping a series of laterally and longitudinally spaced rows of holes, as set forth in claim 1,

and series of longitudinal rows of paired punches on longitudinal rows of said dovetail keys sideways each to the other removably secured in said multiple punch assembly and said rows of punches adapted to be removed separately without disturbing other adjacent rows of punches,

a keeper block interposed longitudinally between each linear opposite row of paired punches removably secured to said backup plate to retain said punches on said dovetail keys in linear spaced relationship, and side caps in combination with said keeper blocks to secure said punches on said dovetail keys in a fixed position and providing a means for separately removing a row of punches from said multiple punch assembly.

3. A multiple perforator for stamping a series of laterally and longitudinally spaced rows of holes as set forth in claim 1,

and a multiple series of longitudinal rows of paired punches, arranged in multiple opposite rows, secured on longitudinal rows of respective dovetail keys sideways each to the other,

and said punches adapted to be separately removed from said perforator without disturbing the position of other punches in said rows,

removable keeper blocks interposed between each row of paired punches adapted to be removed from between opposite rows of punches and platine spacers to hold said punches in fixed position on said dovetail keys and backup plate providing a means for removing punches from said punch assembly after removal of said keeper block.

4. A multiple perforator for stamping a series of laterally and longitudinally spaced rows of holes, as set forth in claim 1,

and a row of single punches and spacers spaced from and adjacent to a row of paired punches providing an odd row of punches,

a removable keeper block secured between a row of paired punches and said odd row of punches to secure said odd row of punches on one of said dovetail keys and backup plate, said keeper block providing a means for removably securing said single row of punches adjacent said row of paired punches.

5. A multiple perforator for stamping a series of laterally and longitudinally spaced rows of holes, as set forth in claim 1,

and a row of single punches and spacers spaced from an adjacent row of paired punches providing an odd row of punches,

a removable keeper block secured between a row of paired punches and said odd row of punches to secure said odd row of punches on one of said dovetail keys and backup plate, said keeper block providing means for removably securing said row of single punches adjacent said pair of punches and said punches adapted to be removed individually from said row of

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single punches without disturbing any other punches in said row of single punches or any other punches in the assembly.

6. A multiple perforator for stamping a series of laterally and longitudinally spaced rows of holes, as set forth in claim 1,

and a row of single punches and spacers spaced from and adjacent to a row of paired punches providing an odd row of punches,

a removable keeper block secured between a row of paired punches, and said odd row of punches to secure said odd rows of punches on one of said dovetail keys and backup plate, providing a means for removably securing said single row of punches adjacent said row of paired punches,

and said dovetail keys adjustably secured between said spaced punches adapted to amplify the wedging between said backup plate and said keeper block.

7. A multiple perforator for stamping a series of laterally and longitudinally spaced rows of holes, as set forth in claim 1,

and a row of single punches and spacers spaced from and adjacent to a row of paired punches providing an odd row of punches,

a removable keeper block secured between a row of paired punches and said odd row of punches to secure said odd row of punches on one of said dovetail keys and backup plate, said keeper block providing means for removably securing said row of single punches adjacent to said row of paired punches and said single punches adapted to be removed individually from said row of single punches without disturbing any other punches in said row of single punches,

a half dovetail key longitudinally aside said dovetail keys secured to said back up plate,

said half dovetail key adjustably secured to said single row of punches and spacers adapted to amplify the wedging between said backup plate and said keeper bar.

8. A multiple perforator for stamping a series of laterally and longitudinally spaced rows of holes as set forth in claim 1,

and a row of single punches and spacers spaced from and adjacent to a row of paired punches providing an odd row of punches,

a removable keeper block secured between a row of paired punches and said odd row of punches to secure said odd row of punches on one of said dovetail keys and backup plate, said keeper block providing means for removably securing said row of single punches adjacent said pair of punches and said punches adapted to be removed individually from said row of single punches without disturbing any other punches in said row of single punches or any other punches in any row of said punches,

a half dovetail key longitudinally aside said dovetail keys secured to said back up plate,

said half dovetail adjustably secured to said single row of punches and spacers adapted to amplify the wedging between said backup plate and said keeper bar, and said end cap for even rows of paired punches removably secured to said backup plate adjacent end rows of punches adapted to be removed to release said punches from said half dovetail key to thereby remove a specific punch from said end rows without disturbing any other punch in said end rows or any other rows of punches.

9. A multiple perforator for stamping a series of laterally and longitudinally spaced row of holes, as set forth in claim 1,

and row of single punches and spacers spaced from and adjacent to rows of paired punches on the sides of said perforator,

half dovetail keys spaced longitudinally aside said dovetail keys on sides of said perforator secured to said back up plate,

keeper blocks removably secured between said paired punches and rows of single punches on the sides of said perforator adapted to fixedly secure said single punches and spacers in said perforator on said half dovetail keys and permit the removal of a particular single punch from said rows of single punches without disturbing any other punch in said single rows or paired punches in other rows of punches.

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References Cited

UNITED STATES PATENTS

345,190	7/1886	Stimpson et al.	83—687
1,835,424	12/1931	Page	83—690
3,077,135	2/1963	Henn	83—698 X
3,100,411	8/1963	Airlie	83—698 X
3,183,757	5/1965	Sorensen	83—690
3,188,001	6/1965	Wales	234—131

10 WILLIAM S. LAWSON, *Primary Examiner*.