

Sept. 30, 1969

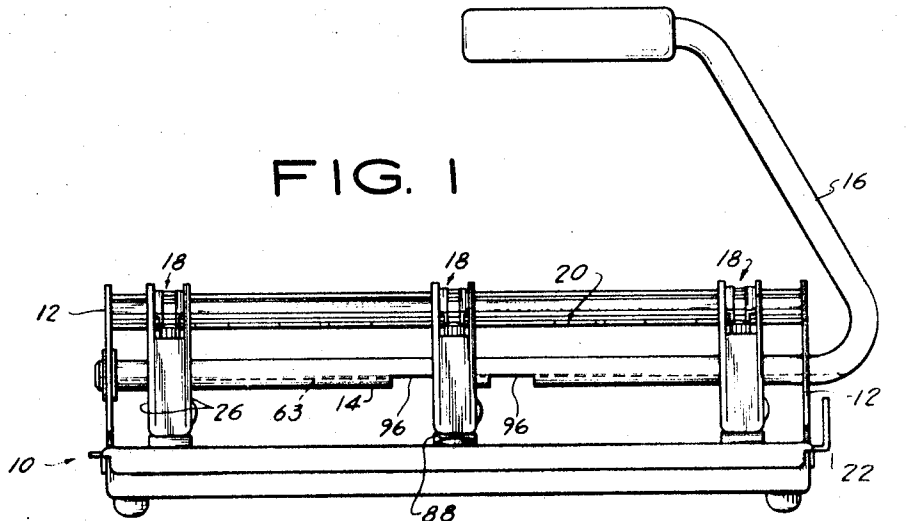
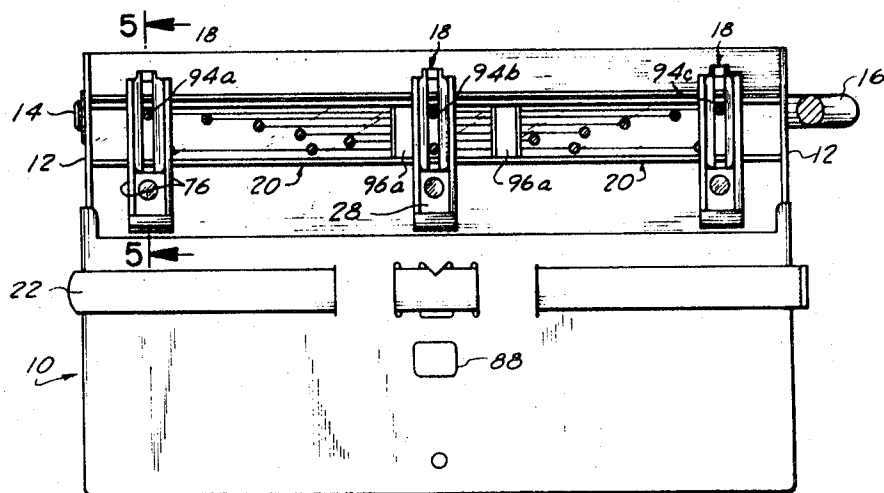
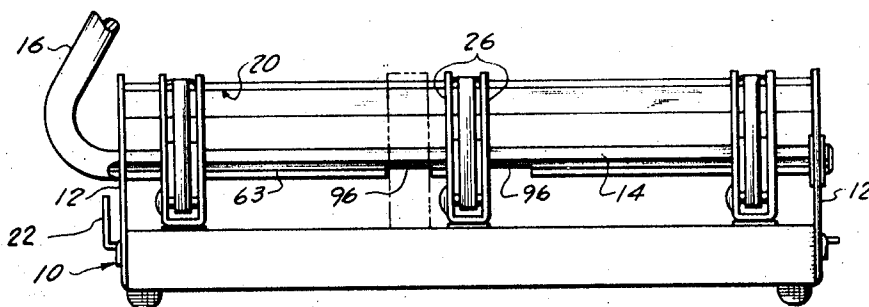
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3,469,486

PAPER PUNCHING DEVICE

Filed Sept. 27, 1967

2 Sheets-Sheet 1



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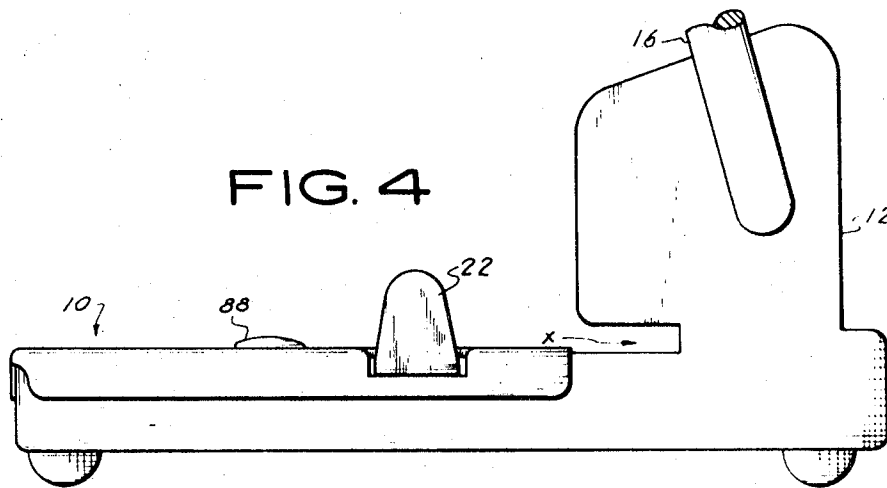
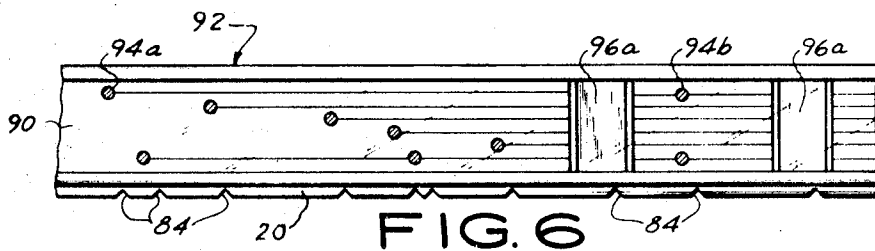
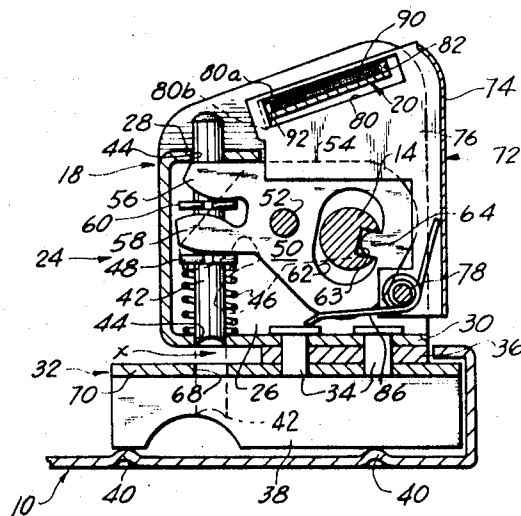
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2 Sheets-Sheet 2



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1

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PAPER PUNCHING DEVICE

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11 Claims

ABSTRACT OF THE DISCLOSURE

A horizontal, longitudinally grooved rod has a handle for manual actuation thereof and plural punch assemblies are slidably carried upon said rod for movement to adjusted relative positions. Each punch assembly includes a frame, a punch member, and a lever coacting between the rod's groove and the punch member to actuate the latter. A notched, elongate plate extends through slots in the punch member's frames and said assemblies include yieldable detents, releasably engageable in notches of said plate to hold said assemblies in adjusted relative positions. Said groove is interrupted at one or more points to deactivate the mentioned lever coaction with a punch member in a punch assembly located at one of said points. The plate bears indicia thereon indicating the location of said deactivation points and also indicating commonly used punch spacing.

Related applications

The invention disclosed herein is, in some respects, an improvement over the invention disclosed in my copending application, Ser. No. 556,394 filed June 9, 1966, now Patent No. 3,387,526.

Background of the invention

This invention relates to paper punching devices having means for changing the relative positions of punches to adapt the device for punching plural holes at various desired relative locations along a marginal portion of paper.

In devices hitherto designed, only partial means were provided for altering the relationship of punches, such partial means involving adjustment of a punch head itself so that a punch therein would be deactivated.

Summary of the invention

The principal object of this invention is the provision of a paper punching device in which punch members may readily be moved to different positions, for punching differently spaced holes, without removing any punch member from the device.

For that purpose, this invention provides plural punch assemblies, slidably mounted on a manually rockable, longitudinally grooved, punch actuating rod, each assembly including a punch, a lever actuated by rocking of said rod and coacting with the punch to actuate the latter, and detent means for holding the assembly in adjusted position on said rod.

Brief description of the drawing

The drawing illustrates a preferred embodiment of the invention without, however, limiting the invention to that particular embodiment. In the drawing:

FIG. 1 is a front elevational view.

FIG. 2 is a plan view, an operating handle portion being omitted.

FIG. 3 is a rear elevational view, an operating handle portion being omitted.

FIG. 4 is a somewhat enlarged, end elevational view as seen from the right side of FIG. 1.

FIG. 5 is a similarly enlarged, vertical sectional view

2

of a punch assembly, substantially on the line 5-5 of FIG. 2.

FIG. 6 is a fragmentary top view of an indicia sheet and a notched plate on which said sheet is carried.

Description of the preferred embodiment

The principal parts of the device disclosed in the drawing are a main base 10 having, toward the rear thereof, substantially similar, upstanding end walls 12, a rockable operating rod 14 borne horizontally in said walls and having an integral, upwardly extending operating handle 16 for rocking said rod, plural punch assemblies 18, carried upon said rod between said walls and slidable to various adjusted positions on the rod, an elongate, notched plate 20 extending through said assemblies in slidable relation thereto for holding said assemblies in adjusted positions and a paper positioning guide bar 22, slidably carried by the base 10, forwardly of the punch assemblies.

Each punch assembly 18, as best shown in FIG. 5, comprises a body 24 formed with opposed side walls 26, a top wall 28, and a bottom wall 30, and a punch assembly base 32 upon which the body 24 is fixed by rivets 34 with an intervening spacing plate 36 providing a paper receptive space x. The operating rod 14 extends, with a close fit, through aligned holes in the side walls 26, and bottom surfaces of side walls 38 of the base 32 slidably engage parallel ridges 40 formed on the main base 10 and extending substantially throughout the width of the device between the latter's end walls 12. The rod 14 and the ridges 40 prevent material angular movement of the assembly 18 about said rod while permitting the assembly to slide freely sidewise of the device.

Each punch assembly further comprises a vertically slidable punch member 42 carried in vertically aligned holes 44 in walls 28 and 30 and yieldably urged to its uppermost or inactive position, shown in full lines in FIG. 5, by a coil spring 46 compressed between wall 30 and a suitable washer 48 retained in a transverse slot in the punch member or otherwise suitably fixed to the latter.

A rockable cam plate 50 is carried on a horizontal stub shaft 52, the ends of which are suitably mounted in the side walls 26. The cam plate is formed with an upper edge 54, a front portion of which abuts the underside of wall 28 to limit clockwise turning of the cam plate as viewed in FIG. 5. A forward portion of the cam plate is formed with a pair of jaws 56, 58 under the latter of which the washer 48 engages to limit the upward movement of punch member 42. A second washer 60, similar to washer 48, is fixed to the punch member 42 in position to extend between the jaws 56, 58.

The cam plate 50 is formed with a rear portion having a substantially oval, cut out 62, its oval configuration being interrupted by an inwardly extending nose 64 which coacts with a longitudinally extending groove 63 formed in the operating rod 14. The rod 14 extends within the cut outs 62 of the cam plates of all the punch assemblies 18 in the illustrated relation to the nose 64.

When the rod 14 is rocked counterclockwise, as viewed in FIG. 5, by operation of the handle 16, the cam plate 50 is rocked about the stub shaft 52 by the nose 64 to cause the jaws 56, 58 to push downwardly upon washers 48 and 60 and, thus, push the punch member 42 downwardly to force its sharp edged lower end through paper in space x and at least partially into a punch hole 68 formed in top wall 70 of the punch assembly base 32. The last mentioned, punching position of member 42 is shown in broken lines in FIG. 5. The handle 16 is operated against the force of spring 46 and the latter pushes the punch member 42 back to its uppermost position upon release of the handle 16.

The several punch assemblies 18 can be shifted to

various adjusted positions along the rod 14 to enable the device to punch holes in various spacing arrangements along a margin of paper inserted into the space x. It is important, however, to provide for locking the assemblies 18 in adjusted positions. This is accomplished by cooperation of a spring-pressed detent or latch member, provided on each assembly 18, with the notched plate 20.

The back of the body 24 of each punch assembly 18 is open; and in that open area is disposed a rockable detent element 72 having a narrow back wall 74 extending to the top of the assembly 18, and similar, opposed, spaced side walls 76 (only one being shown). The detent element 72 is rockably supported at its lower end by a stub shaft 78, borne in the side walls 26 of the punch assembly near the bottom, rear portions of those walls.

The side walls 76 extend upwardly at opposite sides of and free of the cam plate 50 and also are clear of the operating rod 14. Said walls are enlarged at their upper ends and are formed with aligned slots 80 which are in approximate alignment with somewhat similar aligned slots 82 in side walls 26 of the punch assembly's body 24.

The notched plate 20 (FIGS. 5 and 6) extends freely within the slots 80 and 82 of all punch assemblies 18 with its ends close to the inner faces of the device's end walls 12 to prevent material shifting of said plate sideways of the device. The front edges of the plate 20 is provided with plural notches 84 at all locations on said plate where the punch assembly may possibly be located in any desired combination of punching adjustments to which said assemblies may be slid along the rod 14.

The slots 80 may be identical so that front edges 80a thereof may engage with couples of notches of the plate 20, or an edge 80b of one of the slots 80 may be cut back, as shown in broken lines in FIG. 5, sufficiently to be inoperative as a detent, leaving edge 80a as the sole detent in the punch assembly for engagement within a notch 84 of the notched plate 20.

A torque spring 86 is coiled about the stub shaft 78 with one of its ends pressing downwardly upon wall 30 or upon a rivet 34 in said wall, and its other end pressing outwardly upon back wall 74 of the detent element 72 to urge the latter clockwise (as viewed in FIG. 5) about said shaft. Thus, the spring holds the detent edge or edges 80a, 80b yieldably within related notches 84 and slightly shifts or holds the plate 20 against the rear edges of slots 82.

sheet 90 in a suitable channeled receptacle 92 which is

The notched plate 20 preferably carries an indicia suitably fixed upon the top surface of the plate 20. This indicia sheet preferably carries indications of sets or pairs of holes which may be punched by this device after suitable adjustment of the locations of the several punch assemblies 18. Thus, for illustration, the indicia sheet includes representations of three hole locations 94a, 94b, 94c, the three punch assemblies 18 being shown as disposed at said locations in FIG. 2. The detent element 72 has an open top through which the indicia 94a, 94b, 94c are visible between the side walls 76 of the detent element so that the user may readily ascertain that proper location of the punch assemblies has been effected for causing the desired hole spacing in paper being punched. Although reference has only been made to 94a, 94b, 94c, other somewhat similar indicia for indicating different hole spacings appear on the indicia sheet 90 as indicating means for reference in adjusting the punch assemblies to other desired punching positions.

The paper positioning bar guide 22 is conventional and a button 88 which operates means (not shown) for locking the gauge bar in any adjusted position also is conventional.

It is desirable that the device be adjustable not only for punching three holes but also for punching only

two holes. For that purpose, cut-outs 96 are formed toward the center of the rod 14 to interrupt the latter's groove 63, and indicia 96a are included upon the indicia sheet 90 in positions thereon corresponding to the positions of said cut-outs. When one of the punch assemblies 18, usually the center one, is adjusted to a position corresponding to either indicia 96a, the nose 64 of the cam plate of that assembly is clear of any operative portion of groove 63 and is unaffected by rocking of the rod 14; thus said punch assembly remains inoperative.

Shifting of the punch assemblies 18 to desired positions for effecting a desired combination of spacing of punched holes is easily effected by the operator by pressing the top of detent element 72 forwardly against the force of spring 86 to release the edges 80a and/or 80b from engagement with any notch in the notched plate 20, thereby permitting the assembly to be slid bodily along the rod 14 to its desired position, whereafter, release thereof by the operator enables the spring 86 to rock the detent element 73 rearwardly to cause the edges 80a and/or 80b to engage within opposed notches 84 to hold the assembly against shifting from its adjusted position.

As in all hand operated paper punches, the length of the handle 16 has a bearing on the punching capacity of the device. In the subject device, however, its punching capacity is substantially increased not only by providing a relatively long handle but by transmission of the operating force of rod 14 to the punch member 42 through the cam plate 50 rather than by the conventional arrangement for direct coaction of the rod 14 or equivalent operating means with the punch member 42. The cam plate 50, as illustrated, provides a substantial mechanical advantage which, if desired, may be increased by slight forward shifting of the fulcrum of said plate and/or by suitably revising the relationship of the rod 14 with the back end of the cam plate.

Those familiar with paper punching devices will readily understand that the concepts involved in the subject device may be utilized in various ways other than disclosed herein without departing from the invention.

I claim:

1. A paper punching device comprising a rockable, horizontal, operating rod having a crank for operation thereof, plural punch assemblies slidably carried on said rod, each of said assemblies comprising a vertically operable punch member and lever means coacting between said rod and said punch members to operate the latter, said rod having a longitudinally extending, lever actuating surface which moves angularly during rocking of said rod, and said lever means comprising a lever fulcrumed in said assembly and having one arm operatively engaging said surface to derive operation of the lever from rocking of said rod, and another arm operatively engaging said punch member to operate the latter.

2. A paper punching device according to claim 1, said lever coacting with said punch member to move the latter downwardly, and each of said assemblies further comprising spring means coacting with said punch member to urge the latter upwardly.

3. A paper punching device according to claim 1, said rod having a longitudinally extending groove defined at one side thereof by said surface as a first surface, provided for operating said punch member, through said lever, in one vertical direction, and said groove being defined at its opposite side by a second lever actuating surface, extending longitudinally of the rod; said one arm having a portion engaging within said groove for operation of said lever in opposite directions, and said other arm having a pair of jaws within which a portion of said punch member extends for operation of the latter both downwardly and upwardly.

4. A paper punching device according to claim 3, said punch member comprising a cylindrical plunger and said portion of the punch member being a disc fixed to and protruding laterally from an intermediate part of said plunger and extending between said jaws, and said por-

5

tion of said one arm of the lever which engages within said groove being a nose integral with the remainder of the lever.

5 5. A paper punching device according to claim 3, said lever being a flat plate fulcrumed at an intermediate point thereof in said punch assembly, said one arm of the lever being formed with an opening through which said rod extends in a fixed axial position, said opening being sufficiently large to permit rocking of the lever without interference with said rod, and said lever having an integral nose partially defining said opening and extending into said groove to derive lever movement from rocking of said rod about its longitudinal axis.

6. A paper punching device according to claim 3, said groove being interrupted to provide non-lever operating portions of said rod at which a punch assembly is inoperative.

7. A paper punching device according to claim 3, said groove being interrupted to provide non-lever operating portions of said rod at which a punch assembly is inoperative, and said device comprising also an elongate plate, extending in parallelism with said rod and formed with plural notches along an edge thereof, said elongate plate having visible indicia on its top surface, related to said non-lever operating portions of the rod to indicate locations for said punch assemblies on said rod at which a punch assembly is inoperative.

8. A paper punching device comprising a rockable, horizontal, operating rod having a crank for operation thereof, plural punch assemblies slidably carried on said rod, each of said assemblies comprising a vertically operable punch member and lever means coacting between said rod and said punch members to operate the latter, said device further comprising an elongate plate, extending in parallelism with said rod and formed with plural notches along an edge thereof, and each of said punch assemblies further comprising a detent element carried by said assembly and movable in a plane normal to said rod, and spring means urging said detent element into engage-

6

ment with a notch in said elongate plate; said detent element being manually movable against the force of said spring means to disengage it from said plate.

9. A paper punching device according to claim 8, said detent element being pivotally mounted in the punch assembly at the rear thereof and rockable between engaging and non-engaging positions relatively to said elongate plate; an upper portion of said detent element being accessible for manual engagement to rock said element to its said non-engaging position.

10. A paper punching device according to claim 8, said elongate plate extending transversely of the paper punching device within approximately registering slots in said punch assemblies and in said detent elements thereof; an edge of said slot in the detent element of each of said punch assemblies being positioned to engage within a notch in said elongate plate upon movement of the detent element in response to the action of said spring means.

11. A paper punching device according to claim 8, said elongate plate having visible indicia on its top surface indicative of locations for said punch assemblies on said rod and the notches of said elongate plate being related to said indicia with respect to punch spacings indicated thereby.

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U.S. Cl. X.R.

83—549, 588, 618, 633