

March 31, 1942.

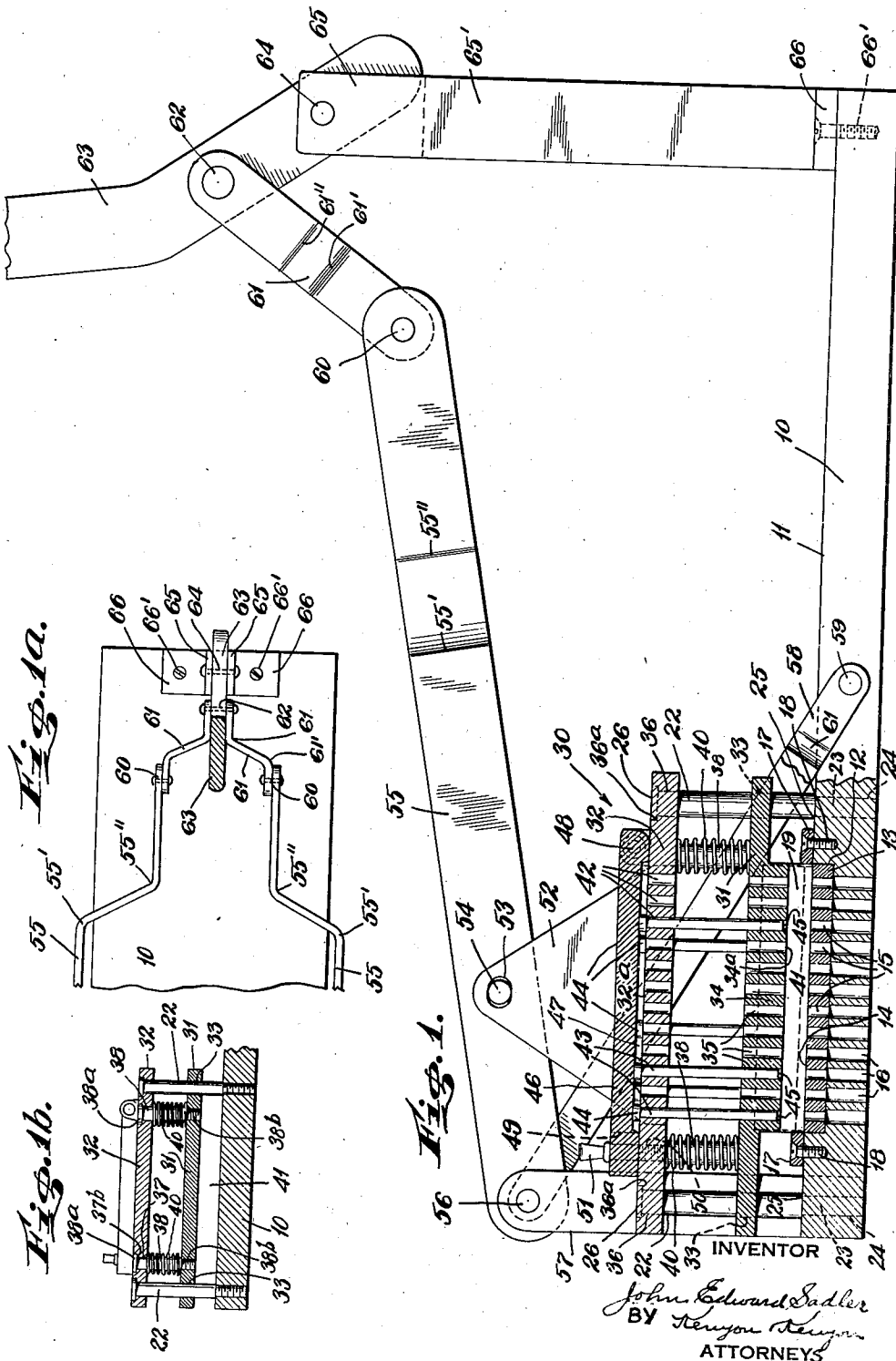
J. E. SADLER

2,278,288

GANG PUNCH

Filed April 4, 1941

2 Sheets-Sheet 1



March 31, 1942.

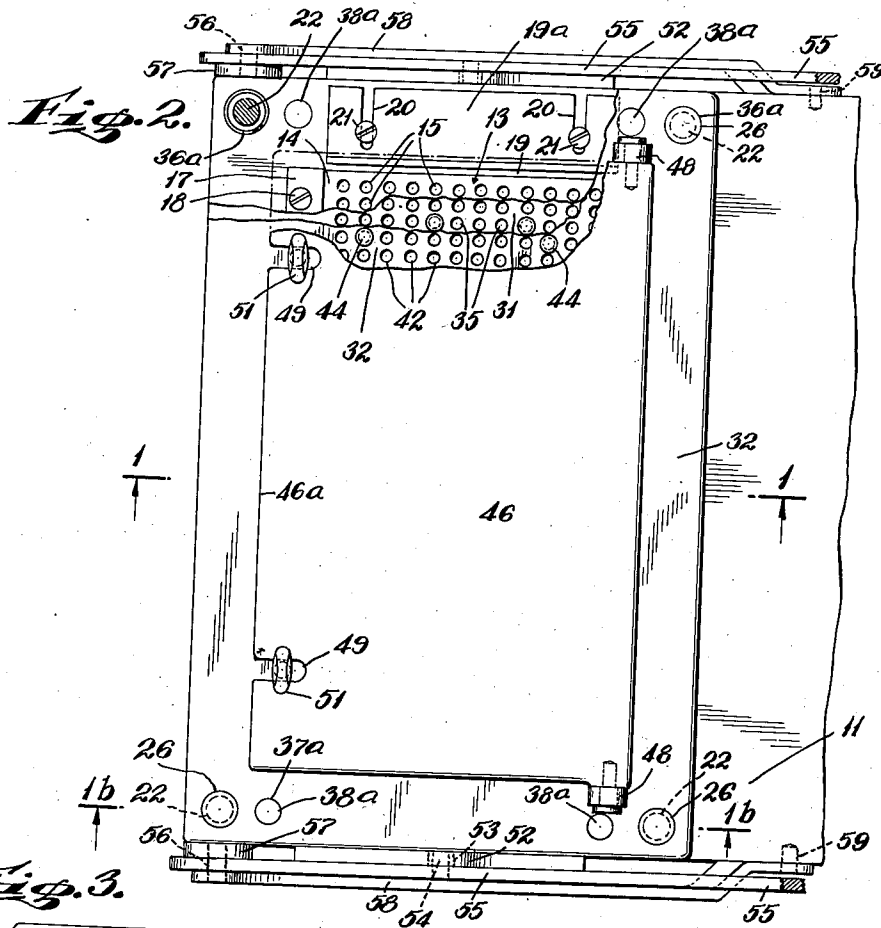
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2 Sheets-Sheet 2



REINSTATE MENT FEE		INTEREST CHARGE	P	ACCOUNT NUMBER	REMITTANCE No.	INURED CLASS	TYPE	DAY DUE	AMOUNT	
\$	¢	\$	¢						DOLLARS	CENTS
0	0	0	0	NAME		0	0	0	0	0
1	1			ADDRESS		1	1	1	1	1
2	2					2	2	2	2	2
3	3					3	3	3	3	3
4	4					4	4	4	4	4
5	5					5	5	5	5	5
6	6					6	6	6	6	6
7	7					7	7	7	7	7
8	8					8	8	8	8	8
9	9					9	9	9	9	9

AMOUNT OF REMITTANCE

70

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UNITED STATES PATENT OFFICE

2,278,288

GANG PUNCH

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2 Claims. (Cl. 164—93)

The present invention relates to punching devices and more particularly to a gang punch designed for punching round holes in multiple thicknesses or layers of paper, cards, or the like, at predetermined locations.

In banking, for example, loans are made to individuals who repay in monthly instalments. The borrowers are each provided with a set of cards corresponding to the number of instalment payments to be made and one of these cards is returned to the bank with each payment. Customarily, the amount of each payment indicated on the card is the same, as is the day of the month and other related information. This data is applied to each card in the form of punch holes which permit the card to be passed through recording business machines at the bank for tabulating and other purposes. Since all the cards bear this same punched data and since the holes must be accurately punched if the cards are to be used in business machines, it is necessary to provide machinery which can be rapidly set up to punch the desired data simultaneously in a plurality of cards and which will permit and facilitate the accurate simultaneous punching of a plurality of cards.

It is a principal object of this invention to provide a punching machine or gang punch which will fulfill these requirements.

Another requirement, which it is an object of this invention to fulfill, is that the arrangement of punches may quickly and conveniently be altered to meet required punching conditions for each new set of cards to be punched.

Still another requirement which it, also, is an object of this invention to fulfill, is that each stack or pack of cards be punched cleanly and accurately without residual burrs on their backs which would make it difficult, if not impossible, for such cards to be run through tabulating machines successfully.

A further requirement, which, too, it is an object of this invention to fulfill, is that the operation of the machine be convenient and easy, needing but little strength on the part of an operator for successful manipulation.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, this invention consists in the novel construction and arrangement of parts hereinafter described and then sought to be defined in the appended claims, reference being had to the accompanying drawings, which show, merely for the purpose of illustrative disclosure, a preferred embodiment of this invention, it being expressly understood,

however, that changes may be made in practice within the scope of the claims without digressing from the inventive idea.

In the drawings, in which similar reference characters denote corresponding parts,

Figure 1 is a side elevation, partially in vertical section, of a gang punch embodying the features of my invention;

Figure 1a is a partial top plan view on a reduced scale illustrating the linkage- and leverage-operating system for operating the punch;

Figure 1b is an end view on a reduced scale viewed from the left of Figure 1;

Figure 2 is a top plan view of the punch portion of the device of Figure 1, broken away in part, at different levels, to illustrate features of construction; and

Figure 3 is a plan view of one form of card, or the like, adapted to be punched in the device illustrated in the first-named figures.

Referring now to the drawings, and first to Figs. 1 and 2, 10 denotes a base for a gang punch made of any suitable material. This base, in the embodiment shown, has rectangular form and a substantially flat-top face 11. A transversely extending recess 12 is provided in this top. Fitted into this recess is a base plate or member 13 of hardened steel or other suitable shock- and wear-resisting material. The plate is so admeasured that its top face 14 lies flush with the face 11 of the base 10.

This plate is provided with a plurality of transversely extending rows of holes 15. In the embodiment shown there are twelve holes in each row and forty equi-distantly spaced parallel rows are provided with corresponding holes of each row in alignment with those of all the other rows. It is to be understood, of course, that fewer or larger numbers of holes per row and, likewise, fewer or larger numbers of rows may be provided.

The base 10 is provided below the plate 13 with a corresponding set of holes 16 which are of somewhat larger diameters than those of holes 13, and in axial alignment therewith. These holes 16 permit free clearance for the punched-out portions of the cards, or the like, as will be hereinafter described more in detail.

Parallely arranged guide bars 17 suitably fixed as at 18 to the top face 11 of the base extend transversely thereof adjacent opposite edges of the plate 13. A transversely extending positioning guide member 19 extending between the guide bars 17 near one pair of ends thereof is provided. This member 19 has a horizontal flange

19a which is slotted at 20 and adjustably positioned on the face 11 of the base by set screws 21, or the like, which extend into the slots 20 so that the member 19 may be adjustably positioned and fixed in predetermined positions in the longitudinal direction of the guide bars 17, and between the latter.

Vertically extending guide posts, or rods 22, are supported suitably from the base 10, being arranged in this embodiment at corners of a rectangle. These posts have reduced lower-end portions 23 which engage threadedly in threaded holes 24 provided in the base 10, with the shoulder 25 between the two portions of each post abutting the top face 11 of the base. Heads 26 at the upper ends of the posts serve as limiting stops as will be hereinafter described.

The punch head denoted generally by the reference character 30 is movable reciprocally on the guide posts or rods 22. This head has a lower, or presser foot and stripping member 31, and a punch-carrying support 32.

The presser foot and stripping member 31 consist of a plate having substantially rectangular form. This plate has openings 33 adjacent to its corners through which the guide posts 22 are adapted to project and is slidable vertically in either direction on these posts. A downwardly projecting flange 34 is provided on the lower face of the member 31. This flange in outline corresponds in shape to that of plate 13 and is adapted and admeasured in size so that in its lowermost position it can extend into the limited space above plate 13, provided by the guide bars 17. Both the presser member 31 and the flange 34 have a plurality of vertical holes 35 corresponding in number and relative position to the holes 15 in plate 13.

The punch-carrying support 32 consists of a plate having substantially the same peripheral shape as member 31. This plate, too, has openings 36 adjacent to its corners through which the guide posts 22 are adapted to project, and is slidable vertically in either direction on these posts. The upper ends of openings 36 are countersunk at 36a to receive the heads 26 of the posts in the uppermost position of support 32, the heads serving to limit upward movement of support 32.

The plate 32 has, also, holes 37 which are countersunk at 37a. Spacing members or bolts 38 having heads 38a are inserted into these holes or openings 37 and engage threadedly at 38b in the member 31, the plate being slidable relative to member 31 on these bolts but limited in movement by the heads 38a.

Compression springs 40 are mounted on the bolts 38 between member 31 and support 32 and serve to maintain a spaced relationship between these parts, limited by the engagement of the bolt heads 38a in the countersunk portions 37a of the holes 37. In this normal spaced relationship, the length of bolts 38 is so admeasured as to maintain the member 31 in spaced relationship with the base 10 leaving a spaced opening 41 between the face 14 of the plate 13 and the lower face 34a of the flange for a purpose to be hereinafter specified.

The support 32, likewise, has a plurality of vertically extending holes 42 in axial alignment and corresponding in number with the holes 35 and 15 in the other parts.

A plurality of punch pins 43 are provided. Each of these pins has substantially circular cross-section and is so admeasured in diameter

as to be movable slidably through any of the openings 15, 35 and 42. At its upper end each pin is headed at 44. Each pin is so admeasured in length that when inserted into a hole 42 through the upper end of the latter, the lower end 45 of the pin, in the normal position of support 32 and member 31, will not in the normal positions of parts project below the surface 34a of the member 31, terminating preferably just short of this surface, as shown in Fig. 1.

One of these punch pins is adapted to be inserted into, and removed at will from, any vertical pair of holes 42 and 35 with the head thereof resting on the top face 32a of support 32.

When a desired set of pins has been inserted into the required pairs of holes 42 and 35, it is necessary to lock the pins against relative movement with respect to the support 32. To this end, any suitable clamping means is provided.

This means, in the embodiment shown, comprises a locking plate 46. The latter, on its bottom face, has a recess 47 of sufficient depth to receive the heads 44. The plate is suitably hinged at 48 to the support 32.

Suitable means are provided to lock the plate 46 over the heads 44. To this end, in the embodiment shown, a slot or slots 49 are provided in the plate 46. These slots extend transversely from the edge 46a of the said plate and are longer than they are wide. A locking pin 50 threadedly engaging in the support 32 is provided for each slot and extends through the latter, terminating in a flattened transverse head 51.

The heads 51 are so admeasured that, when they extend parallel with the length of the slots 49, the locking plate 46 may be lifted from the support 32 and rotated about the hinges 48. On the other hand, when they extend transversely of the slots, the plate 46 is locked in place. Since the pins 50 engage threadedly in the support 32, the plate 46 may be tightly clamped to the said support, serving them to secure the punches 43 firmly to the said support.

Means for operation of the punch head 30 are provided. To this end, the support 32 is provided with upwardly extending yoke flanges 52. Each flange has a slotted pivot opening 53 in which a pivot pin 54 engages loosely. Each pivot pin is secured intermediate the ends of a lever 55. One end of each lever 55 is pivotally joined at 56 to a vertical support or fulcrum bar 57. The said bar in turn is rigidly secured to the base 10 and further supported vertically by the brace bar 58 which is secured both to the base 10 at 59 and to the bar 57 at 56.

Each lever 55 after being bent at 55' and 55'' (Fig. 1a) has its opposite end pivotally joined at 60 to a link 61. Each link, in turn, is suitably bent at 61' and 61'' and pivoted at 62 to a single centrally located operating lever 63. The operating lever is pivotally joined at 64 between times 65 to a centrally located upright or fulcrum bar 65' which, in turn, has oppositely extending flanges 66 which are supported suitably at 66' from the base 10. The lever 63 serves through links 61 to operate the levers 55 in unison. This lever and linkage system upon rotation of the lever 63 effects corresponding vertical movement of the punch head 30 as will be hereinafter described. The linkage and levers are so arranged as to provide leverage in favor of the operator.

One form of card adapted to be punched in the device of this invention is illustrated in Fig. 3. Therein, the card 70 has substantially rectangular

lar form and a width closely approximating that between the opposite inner faces of the guides 17. The card has spaces designated thereon for the insertion by hand of certain data, such as, name, address, remittance number, et cetera. Also, the card has on its face a plurality of transversely arranged parallel rows A of numerals, the numerals in each row being in series for 0 to 9, and equi-spaced from each other. The rows A are also equi-spaced from each other. The spacing, between figures and rows, is equal to that between the holes 15 of plate 13. In the card shown, the rows A are located at the right of the card, and, also, between the right side of the circles B and the name and address spaces. It is to be understood that the card may be provided over its entire surface with rows A of numerals or with other arrangements of rows A besides those shown.

In operation of the machine, if, for example, the operator wishes to punch out of a plurality of cards the various numerals encircled in Fig. 3, he releases the locking plate 46, turning it back on its hinges 48 to expose the support 32, and inserts a punch pin 43 into each one of the holes 42 which corresponds in position to one of the encircled numerals of the card 70. He then covers the so mounted punch pins with the locking plate 46 and clamps the latter thereover by the headed screws or pins 50, as described.

The rear guide 19 is then adjusted to such position, that, when the card edges 70a about this guide, each encircled numeral will lie directly under that punch pin which is to punch it out.

After such adjustment of the guide, a stack or pile of the cards 70 are slid into the space 41 between the guide 17 until their ends 70a about the rear guide 19.

The lever 63 is then rotated in such direction as to cause punching of the stack of cards. This punching takes place as follows: Rotation of lever 63 is transmitted through the links 61 to levers 55 which, in turn, move the flanges 52, and, consequently, the support 32, downwardly on the guide posts 22. Since the pins 43 are rigidly held with respect to the support 32 by the locking plate 46, they, too, move downwardly toward the cards. At the same time, the downward motion of support 32 is transmitted through springs 40 to the presser member 31 which then also moves downwardly into pressing engagement through its flange 34 with the stack of cards in space 37. This pressing engagement forces out all air between the individual cards in the stack pressing them closely together and crushing any burrs or edge fibres of the cards. While so pressed together, continued downward movement of the lever 63 causes the punch pins 43 on the continuing downward movement of support 32 to punch through the card stack and force the punched-out parts through holes 15 in plate 13 and holes 16 in the base 10, the ends 45 of the punch pins following through the punched holes into the holes 15 to force the punchings out through holes 16.

Upon release of the lever 63 and its rotation in the opposite direction, the springs 40 first move the support 32 upwardly while maintaining pressing engagement of the presser member 31 with the cards, until the punch pin ends 45 have moved upwardly to clear the cards. When this has occurred, the further release motion of lever 63 permits the springs 40 to return to equi-

librium condition and return the support 32 and member 31 to the positions shown in Fig. 1. The member 31 serves thus both as a presser foot and as a stripper and insures clean, regular punching-out of the required holes in the stack of cards. Since the stack is firmly pressed together during punching movement therethrough of the punches, and during retraction, the holes are punched without leaving burrs or ridges around the openings.

The operations described are repeated for each stack of cards punched, the punches being rearranged readily as necessary between punchings.

The device described herein permits quick, accurate punching as desired, of stacks of cards for banking and other purposes. The leverage ratio in favor of the operator is sufficiently large to reduce required operating effort to a minimum. Ruggedness and long life of parts are also characteristics of the machines.

The punch described is, of course, useful for punching holes in paper coupons arranged in book form and in other piled sheet papers at desired points, and, in fact, wherever cleanly punched holes are desired.

It is to be understood that variation as to details is contemplated within the scope of the claims. There is no intention of limitation to the exact details shown and described.

What is claimed is:

1. In a device of the character described, a base member having a plurality of vertically extending perforations, a punching head guidably mounted in spaced relationship over said base member, individually-removable punching elements carried by said head, and means for moving said head-carried elements toward and away from said base member, said means comprising vertically-extending members rigid with said base, a vertically-extending member rigid with said head, a lever pivotally connected to one of said first-named vertically extending members and with said second-named vertically extending member, an operating lever pivotally connected to another of said first-named vertically extending members and a link member pivotally connecting said two levers, said levers being arranged and admeasured to provide a leverage ratio in favor of the operator for moving said head.

2. In a device of the character described, a base member having a plurality of vertically extending perforations, a punching head guidably mounted in spaced relationship over said base member, individually-removable punching elements carried by said head, and means for moving said head-carried elements toward and away from said base member, said means comprising vertically-extending members rigid with said base, vertically extending members rigid with said head, levers pivotally connected to said first-named vertically extending members and to said second-named vertically extending members, another vertically extending member rigid with said base, an operating lever pivotally connected to said last-named member, and link members pivotally connected to said operating lever and to said first-named levers, all said levers being arranged and admeasured to provide a leverage ratio in favor of the operator for moving said head.

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