Oct. 23, 1923. 1,471,571

A. RUBIN

PUNCHING MACHINE

Filed Jan. 16. 1922 2 Sheets-Sheet 1

Fig. 1

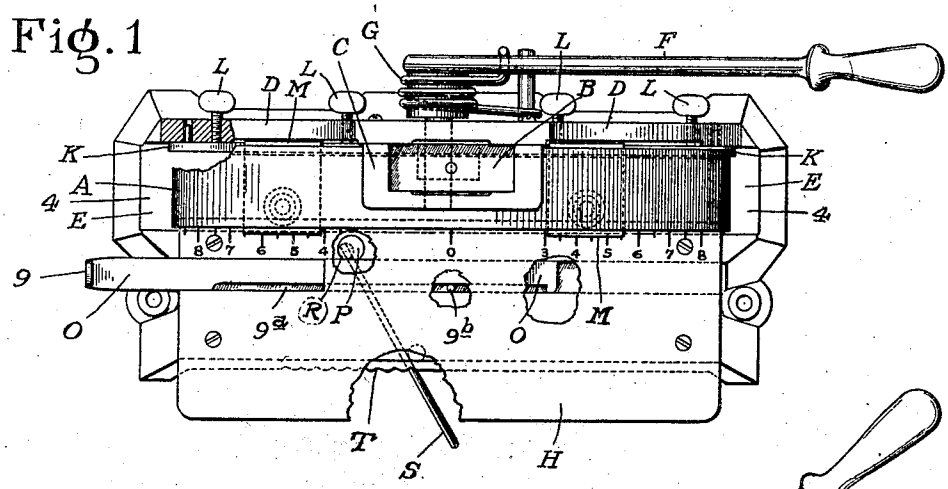
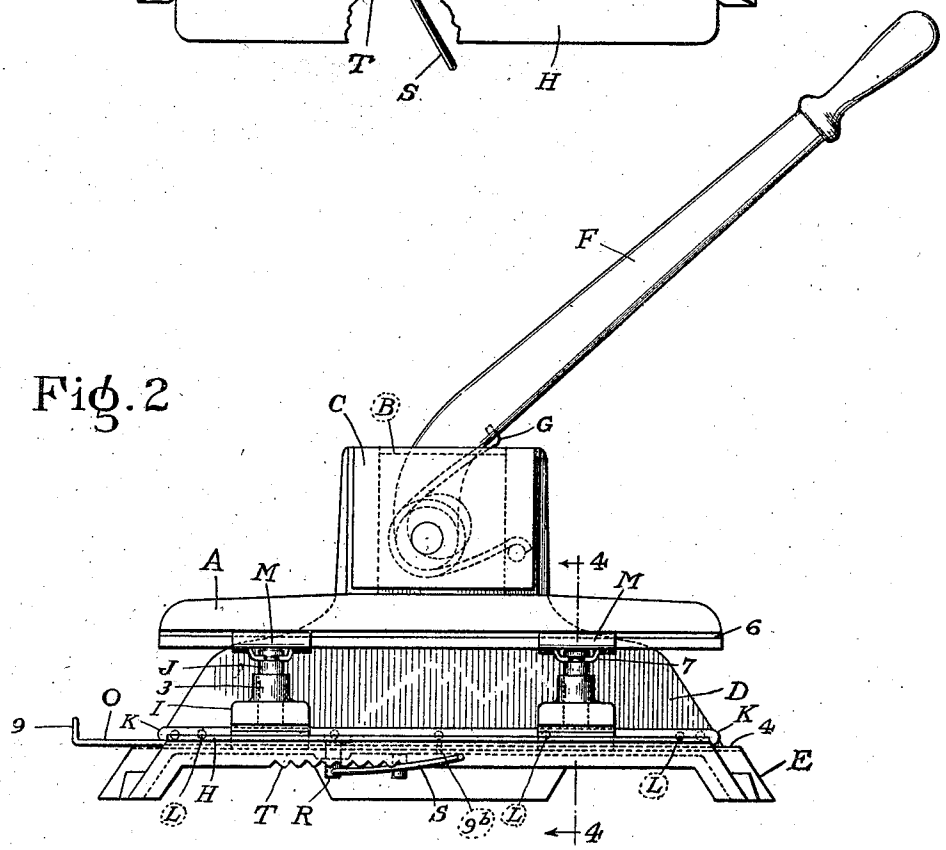


Fig. 2



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Fig. 4

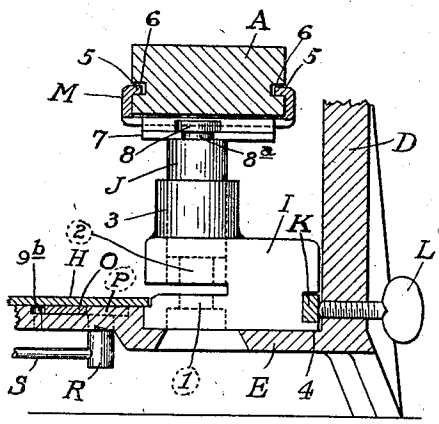


Fig. 5

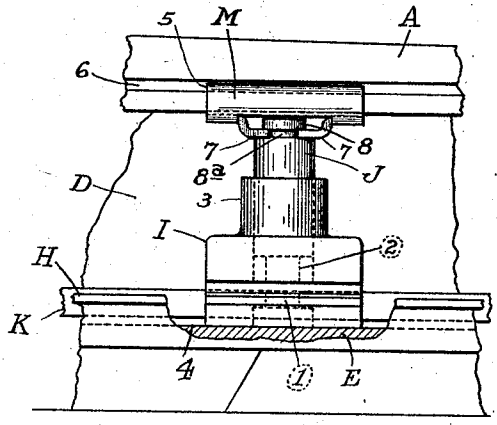
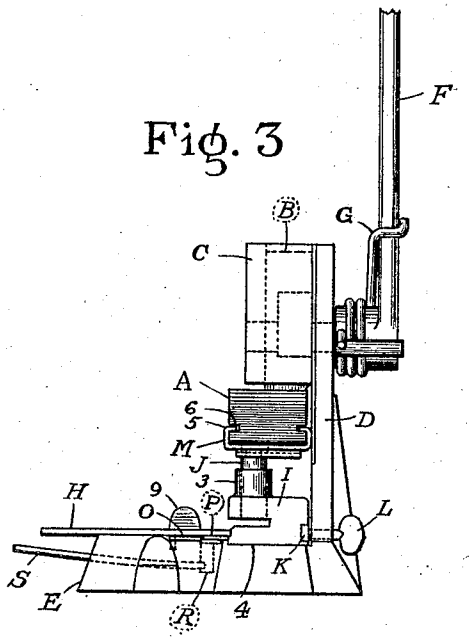


Fig. 3



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Patented Oct. 23, 1923. 1,471,571

UNITED STATES PATENT OFFICE.

ADOLPH RUBIN, OF ST. LOUIS, MISSOURI.

PUNCHING MACHINE.

Application filed January 16, 1922. Serial No. 529,617.

To all whom it may concern:

Be it known that I, ADOLPH RUBIN, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Punching Machines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to punching machines of the kind in which a punching unit consisting of a punch and a die is mounted in the machine in such a manner that it can be adjusted in various positions or removed and replaced by a different punching unit.

One object of my invention is to provide a punching machine of the general type referred to in which the reciprocating platen or head of the machine is provided with a novel means for positively retracting or withdrawing the punch of the punching unit from its co-operating die.

Another object is to provide a punching machine of the general type referred to that is equipped with a highly efficient and easily operated means for retaining a plurality of punching units in adjusted position.

And still another object is to provide a punching machine that has all of the necessary requisites to a commercially successful machine intended to be used for punching sheets for loose leaf binders, namely, punching units that can be easily adjusted into various positions and locked, and also replaced by different punching units, means for positively withdrawing the punches from their co-operating dies when the platen of the machine moves upwardly or back to normal position and a work gauge that can be quickly and easily set so as to properly position the sheets with relation to the punching units. Other objects and desirable features of my invention will be hereinafter pointed out.

Figure 1 of the drawings is a top plan view of a punching machine constructed in accordance with my invention.

Figure 2 is a front elevational view of said machine.

Figure 3 is an end view of the machine.

Figure 4 is an enlarged sectional view taken on the line 4—4 of Figure 2; and

Figure 5 is an enlarged front elevational view of a portion of the machine, illustrating the construction of one of the punch retracting devices on the platen of the machine.

Referring to the drawings which illustrate the preferred form of my invention, A designates the vertically-reciprocating platen or head of a manually-operated punching machine that is connected to the lower end of a slide B mounted in a guideway C that projects forwardly from the front side of a vertically-disposed plate D which projects upwardly from the base E of the machine. The platen is moved upwardly and downwardly by a means, such, for example, as an eccentric, combined with the slide B and connected to an operating shaft that is provided with a handle F, said slide and operating handle being normally maintained in an elevated position, as shown in Figure 2, by means of a spring G that is combined with the operating handle.

The base E is provided with a work table H for receiving the sheets or other objects to be punched, and the machine is equipped with one or more punching units of such construction that they can be arranged in various positions or replaced by other punching units. Preferably, each of the punching units consists of a die 1 formed in a die block I and a co-operating punch 2 connected to the lower end of a vertically-disposed plunger J that is slidingly mounted in a sleeve 3 which projects upwardly from the die block I. The die block is adjustably mounted in a transversely-disposed guideway 4 in the base E of the machine and is retained in position by a transversely-disposed clamping bar K that fits in a notch in the rear end of the die block and which is held in clamping engagement with the die block by means of clamping screws L mounted in the vertically-disposed plate D at the rear side of the base of the machine. When the machine is equipped with a plurality of punching units, as herein illustrated, a single clamping bar K is used for locking the die blocks of the various punching units, said clamping bar being so arranged that when the screws L are tightened the die blocks will be moved forwardly into engagement with the front wall of the transversely-disposed guideway 4 in the base of the machine. The clamping bar K prevents the rear ends of the die blocks from moving upwardly and the front ends of said die blocks are prevented from moving upwardly by the rear

end portion of the work table H of the machine which overhangs the die blocks or projects into recesses in the front ends of the die blocks, as shown in Figure 4. The guideway 4 in the base of the machine is open either at one or at both ends so that the die blocks can be easily inserted in same and then moved transversely of the base of the machine into adjusted position.

In order that the punches 2 of the punching units will be positively retracted from their co-operating dies when the platen A of the machine moves upwardly, said platen is equipped with retracting devices that exert an upward pull on the plungers or shanks J of the punches when the platen A of the machine moves upwardly. In the form of my invention herein illustrated each of the punch retracting devices consists of a substantially yoke-shaped member M arranged on the underside of the platen of the machine and provided with flanges 5, as shown in Figures 4 and 5, that project into grooves 6 in the platen that extend transversely across the front and rear sides of the platen, said retracting device being provided on its underside with a pair of flanges 7, arranged at right angles to the flanges 5, that co-operate with a head piece 8 on the upper end of the punch shank J of the punching unit with which said retracting device co-operates. The transversely-disposed grooves 6 in the platen of the machine are open at one or at both ends so that the flanges 5 of the retracting devices M can be easily inserted in same, and said grooves are of such dimsensions as to insure the retracting devices M moving along the platen A when the die blocks I of the punching units are shifted transversely of the base of the machine to arrange the punching units in a different position. The flanges 7 on the underside of each of the retracting devices are parallel throughout their entire length and the ends of same are spaced apart so as to enable the head piece 8 on the plunger J of the punching unit with which said retracting device co-operates to be easily arranged in engagement with said flanges by introducing a contracted portion or neck portion 8^a on the plunger into the open-ended slot between said flanges. In view of the fact that the flanges 7 of each retracting device are of considerable length and extend transversely across the underside of the platen A, said retracting device will accommodate punching units of various kinds and sizes, namely, punching units in which the punches and dies are large or small or punching units in which the punches and dies are arranged comparatively close to the rear edge of the work table H, or some distance to the rear of the rear edge of the work table. In other words, the flanges 7 make it possible to use a punching unit in which the punch is arranged adjacent the front end of the die block or a punching unit in which the punch is arranged at the center or adjacent the rear end of the die block.

The work table H is equipped with an adjustable work gauge for enabling the sheets or other objects to be quickly arranged in proper position with relation to the punching units. In the form of my invention herein illustrated the work gauge is formed by an upwardly-projecting stop or lug 9 on a bar O that is slidingly mounted on the underside of the work table in a transversely-disposed groove in the top side of the portion of the base E on which the work table rests. The bar O is retained in adjusted position by means of a clamping device consisting of a cam P, shown in broken lines in Figure 1, that is adapted to engage the rear edge of said bar and move it forwardly into clamping engagement with the front wall of the groove in the base in which said bar is mounted, the cam P being connected to the upper end of a vertically-disposed shaft R oscillatingly mounted in the base and provided at its lower end with an operating handle S that projects forwardly underneath the work table and terminates adjacent the front edge of same. The bar O is provided in its front edge with a longitudinally-disposed notch 9^a that receives a stationary pin 9^b in the base of the machine so as to prevent said bar from being removed from the base. Various means may be used for locking the operating handle S, but I prefer to equip the base E with a notched rack T over which the operating handle S can be moved and retained in engagement therewith by the resiliency of the metal from which said operating handle is formed. In order that the work gauge 9 may be arranged in such a position that it is located comparatively close to the center of the work table H, said work table is provided with a notch that extends inwardly from the left hand edge of same at a point in alignment with the bar O, as shown in Figure 1, and which is wide enough to provide a clearance for the gauge 9 when the same is moved inwardly so as to adapt it to very narrow sheets. When it is desired to change the position of the gauge 9 the handle S is depressed slightly so as to disengage it from the rack T, and said handle is then turned in the direction to cause the cam P to release the bar O which carries the gauge. The bar O can then be moved transversely of the base of the machine to arrange the gauge 9 in the proper position, and thereafter the handle S is swung back to normal position so as to force the cam P into clamping engagement with the rear edge of the bar O.

In order to assist the operator in setting the punching units in proper position, the work table is provided at its center, adjacent the guideway 4, with a center mark or zero mark, as shown in Figure 1, and at opposite

sides of said center mark are graduations provided with numerals that represent inches. Assuming that the machine is provided with two punching units, as herein illustrated, and that the operator desires to change the position of said punching units, the first step in adjusting said punching units is to release the screws L that act on the clamping bar K. Thereafter, the die blocks I of the punching units are moved transversely of the base of the machine so as to arrange said die blocks closer together or space them farther apart, the operation of adjusting the die blocks causing the retracting devices M on the platen of the machine to move longitudinally of the platen, and thus remain in operative relationship with the punches which they operate. If it is desired to set the machine so that it will punch two holes in each sheet five inches apart, the die block of the right hand punching unit is arranged so that the center of same aligns with the graduation mark of the right hand group of graduations marked with the numeral five and the die block of the left hand punching unit is arranged in such a position that the center of same aligns with the graduation mark of the left hand group of graduations that is marked with the numeral five. Thereafter, the screws L are tightened so as to clamp the die blocks of both punching units in adjusted position. In setting the gauge 9 a sheet of the size that is to be punched is creased at its center and said sheet is then arranged on the work table in such a position that the crease in same aligns with the center mark on the work table. Thereafter, the gauge 9 is moved into engagement with the left hand edge of the sheet and locked in position in the manner previously described, thus causing said gauge to be held in such a position with relation to the punching units that the sheets which are thereafter placed on the work table and held with their left hand edges against the gauge will be provided with holes spaced exactly five inches apart and at an equal distance from the side edges of the sheets.

A machine of the construction above described is easy to operate and adjust and there is no liability of the punches sticking, due to the fact that the punches are positively retracted when the platen of the machine moves upwardly. The punches are operatively connected with the platen of the machine, but they are connected in such a way that they are free to move relatively to the platen when the die blocks are moved into a different position, thus simplifying the adjustment of the machine. Still another desirable feature of my improved machine is that the retracting devices are so constructed that various kinds and sizes of punching units can be used with same. The machine can be manufactured at a low cost, on account of its simple design, it is strong and rugged enough to stand up under rough usage and it is very compact.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A punching machine, comprising a reciprocating platen, a punch and die combined to form a single punching unit that is adjustably mounted on the base of the machine, and means for positively retracting the punch when the platen of the machine is restored to its normal position, said means being so constructed that it permits the punching unit to be adjusted longitudinally and transversely of the platen without destroying the operative relationship between said retracting means and punch.

2. A punching machine, comprising a reciprocating platen, a base, an adjustable punching unit carried by the base and consisting of a die and punch, means for holding said punching unit in adjusted position on the base, and means actuated by the platen for positively retracting the punch from its co-operating die when the platen of the machine is restored to normal position, and having provision for enabling the punch to be adjusted longitudinally and transversely of the platen.

3. A punching machine, comprising a platen, a base, a punching unit mounted on said base in such a manner that it can be adjusted transversely thereof into different positions, means for retaining said punching unit in adjusted position, and a retracting device on the platen of the machine for positively withdrawing the punch from the die when the platen of the machine is raised, and combined with the punch in such a way that the punch can be adjusted relatively to the platen in two different directions at right angles to each other.

4. A punching machine, comprising a reciprocating platen, a base, a punching unit mounted on said base in such a manner that it can be adjusted transversely thereof, and a retracting device for the punch of said punching unit operatively connected with the platen and comprising a movable part capable of being adjusted relatively to the platen in one direction and combined with the punch in such a way that the punch can be adjusted in a direction at right angles to the direction in which said part is adjusted.

5. A punching machine, comprising a reciprocating platen, an adjustable punching unit mounted in the base of the machine and comprising a die and a punch, means for holding said punching unit in adjusted position on the base, a retracting device on said platen that can be adjusted longitudinally of same, and a connection between said retracting device and punch that permits the

punch to be adjusted transversely of the platen.

6. A punching machine, comprising a reciprocating platen, a base, a punching unit mounted on said base in such a manner that it can be adjusted transversely of the base lengthwise of said platen, a retracting device on the platen mounted in such a manner that it can move longitudinally of same, and a connection between said retracting device and the punch of the punching unit.

7. A punching machine, comprising a reciprocating platen, a base, an adjustable punching unit mounted on said base and comprising a die and a punch, a retracting device on the underside of the platen provided with portions that project into longitudinally-disposed grooves in the platen, and a head piece on said punch that is slidingly mounted in a guideway on said retracting device arranged at right angles to said platen.

8. A punching machine, comprising a reciprocating platen, a base, a punching unit mounted on said base in such a manner that it can be adjusted transversely thereof, a retracting device on the underside of said platen provided with flanges that are slidingly mounted in longitudinally-disposed grooves in the front and rear sides of the platen, flanges on the underside of said retracting device arranged at right angles to the longitudinal axis of the platen, and a head piece on the punch of the punching unit arranged in engagement with the flanges last referred to.

9. A punching machine, comprising a base provided with a transversely-disposed guideway, a plurality of adjustable punching units comprising die blocks arranged in said guideway, a transversely-disposed clamping bar arranged in horizontally-disposed grooves in the rear ends of said die blocks, means for forcing said clamping bar forwardly so as to clamp said die blocks against the front wall of said guideway, said bar acting to prevent the rear ends of the die blocks from moving upwardly and means on the base of the machine that overlaps the front ends of said die blocks and prevents them from moving upwardly.

10. A punching machine provided with a base, a work gauge provided with a bar that is slidingly mounted in a guideway in said base, and a cam that is adapted to be moved into engagement with one of the longitudinal side edges of the bar for retaining the gauge in adjusted position.

11. A punching machine provided with a base, a work gauge provided with a bar that is slidingly mounted in a guideway in said base, a cam that is adapted to be moved into engagement with one of the longitudinal side edges of the bar for retaining the gauge in adjusted position, a handle for operating said cam, and a notched rack on said base adapted to be engaged by said handle.

12. A punching machine provided with a base equipped with a work table, a work gauge provided with a horizontally-disposed bar slidingly mounted in a guideway in said base, a locking device that acts on one of the longitudinal side edges of said bar, and a slot in the work table extending inwardly from one of the edges of same so as to provide a clearance for said work gauge.

ADOLPH RUBIN.