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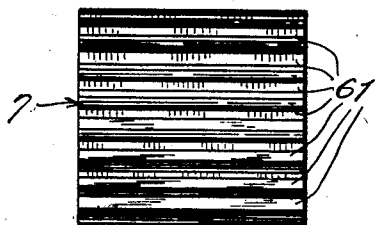
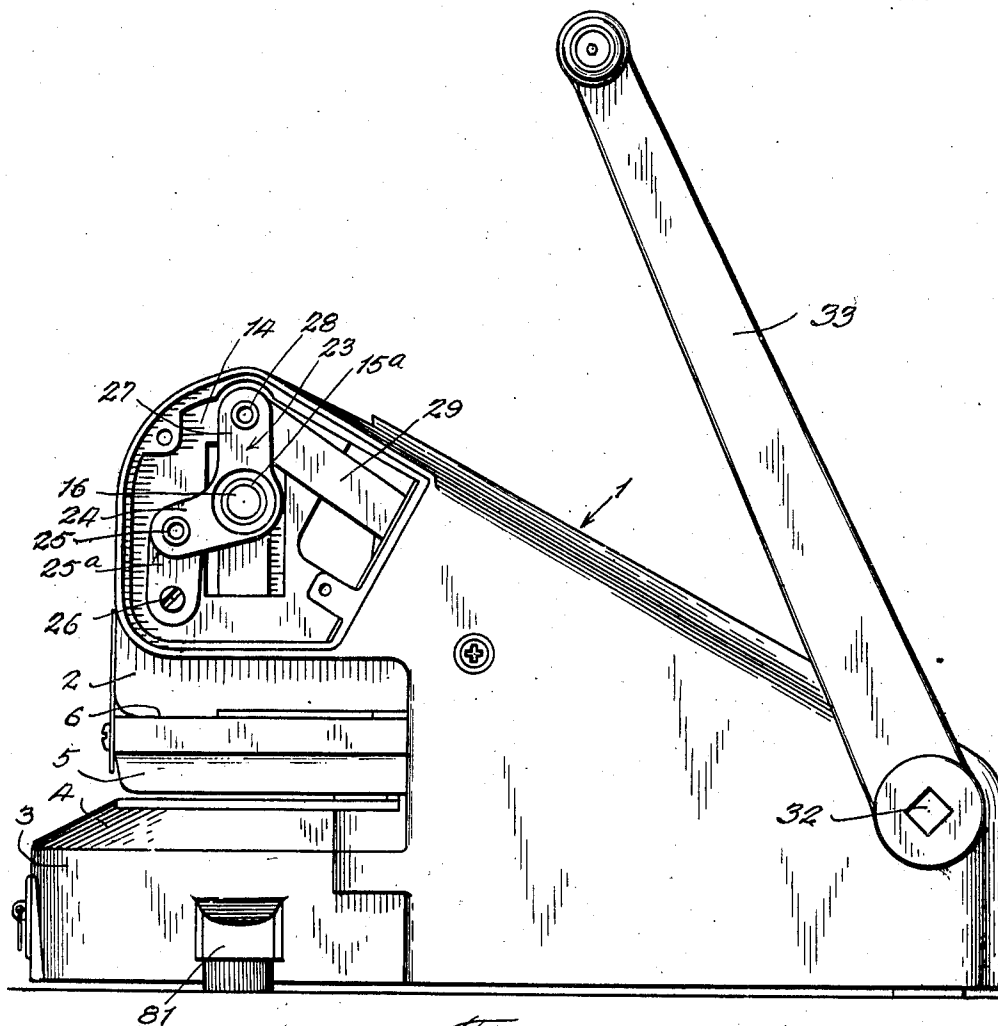
E. G. RIX

2,330,997

PERFORATING MACHINE

Filed Aug. 6, 1941

3 Sheets-Sheet 1



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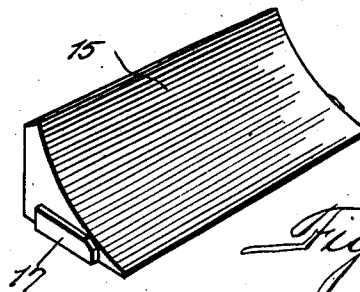
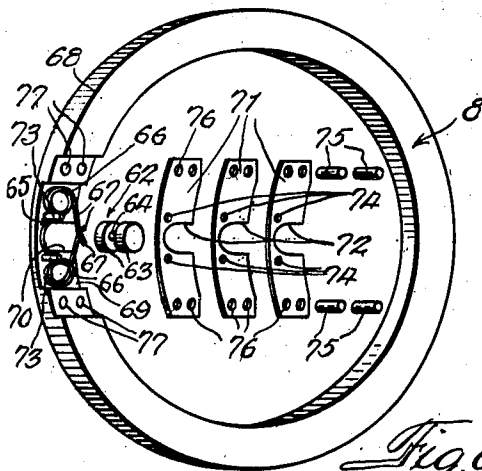
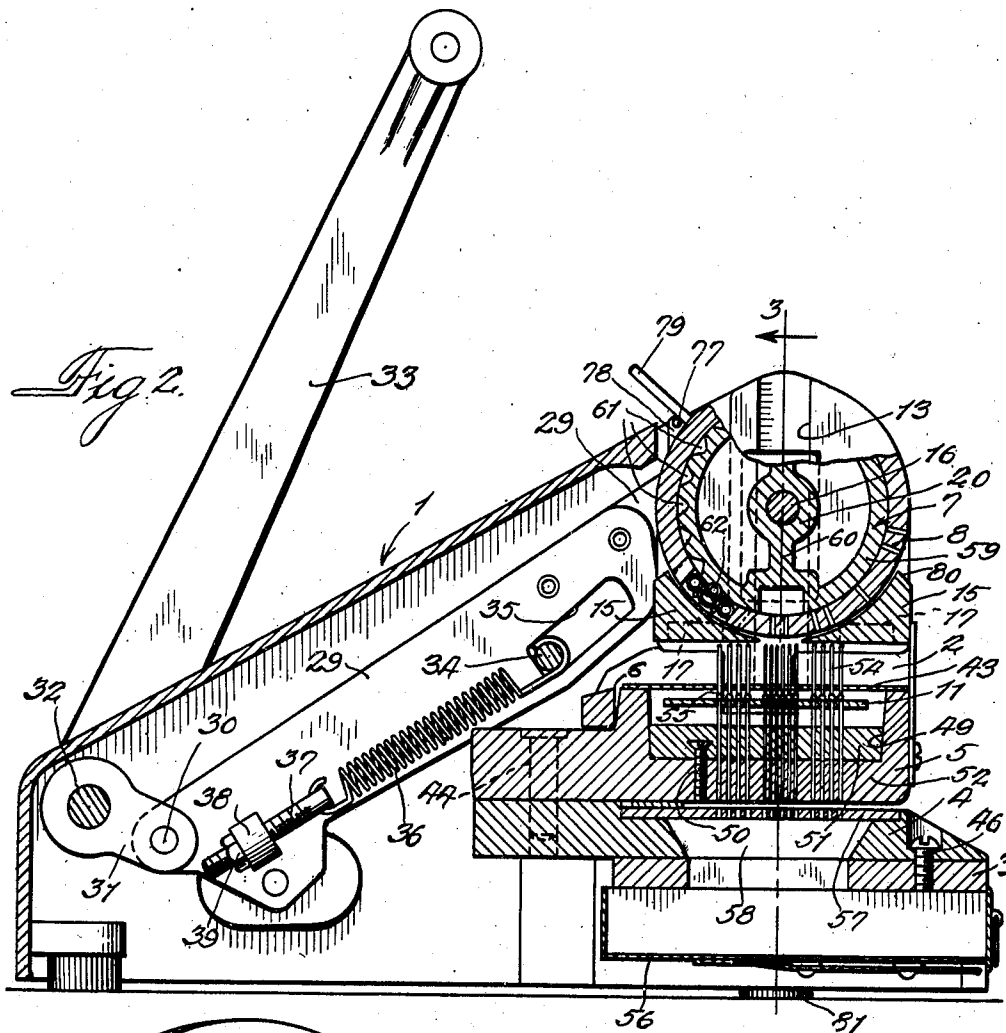
E. G. RIX

2,330,997

PERFORATING MACHINE

Filed Aug. 6, 1941

3 Sheets-Sheet 2



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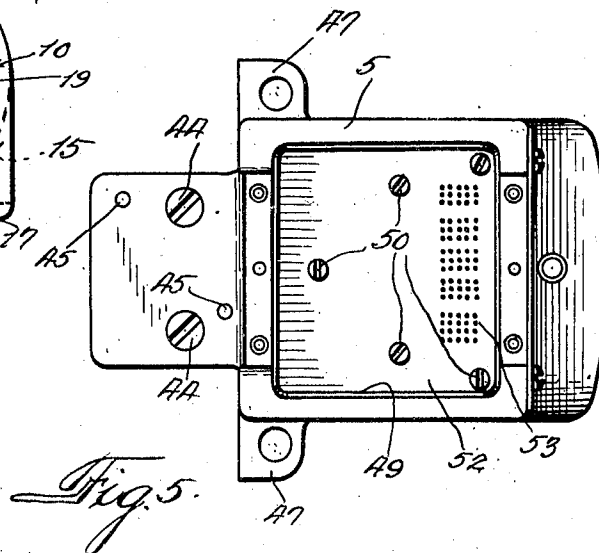
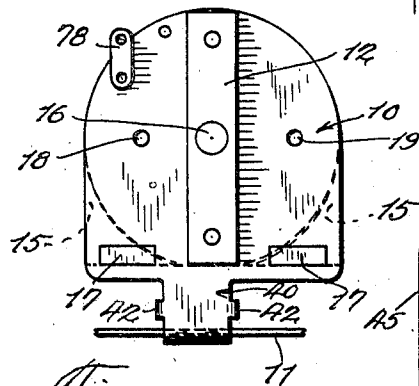
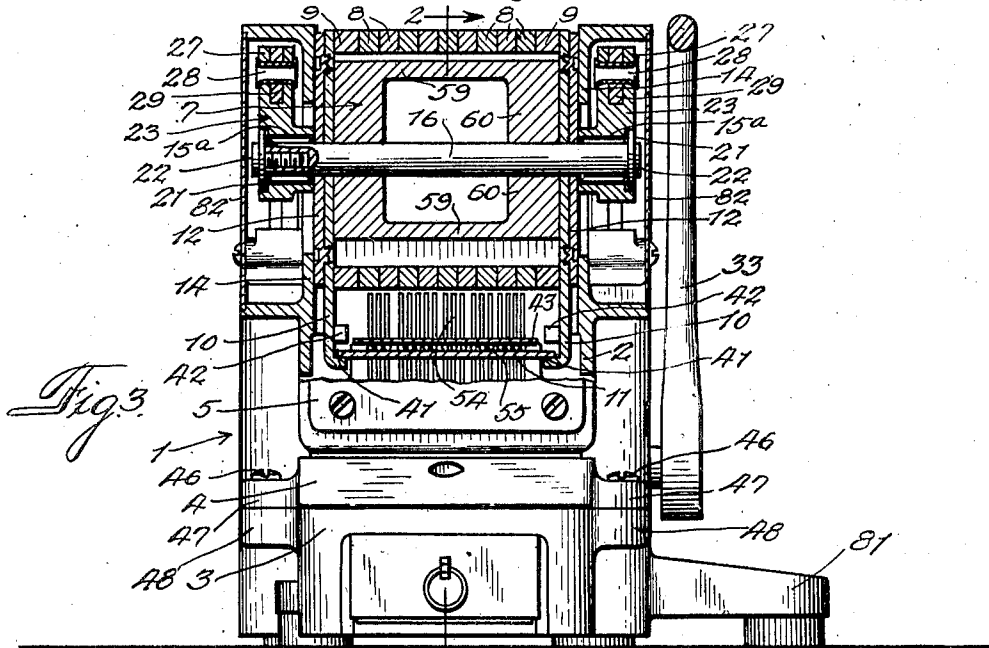
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2,330,997

PERFORATING MACHINE

Filed Aug. 6, 1941

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,330,997

PERFORATING MACHINE

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Application August 6, 1941, Serial No. 405,689

17 Claims. (Cl. 164—114)

My invention relates to perforating machines of a type having wide application, such as cancelling checks, dating labels, dating incoming mail, numbering work and job tickets, and other uses where a number of papers are to be marked at one time.

One of the objects of my invention is to provide a perforating machine which does not require the services of a skilled mechanic in disassembling and making minor repairs.

A further object of my invention is to provide a perforating machine designed for interchangeability of parts.

A further object of my invention is to provide an arbor assembly which largely eliminates the use of screws and dowels in putting together the various parts of the assembly.

A further object of my invention is to provide a perforating machine in which the head part of the casting fits down on the punch holder, thus insuring its rigidity during the stripping action.

A further object of my invention is to provide a punch holder in which the stripper part is cast in one piece.

A further object of my invention is to provide a perforating machine in which the mounting bosses of the die shoe are in the rear of the punches, thereby allowing more hand room when feeding papers to the machine.

A further object of my invention is to provide a rectilinearly movable arbor controlled in its sliding movement by bell crank apparatus on both sides of the arbor.

A further object is to provide the arbor with improved detent means for holding the rings in their different adjusted positions.

Further objects and advantages of the invention will be apparent from the description and claims.

In the drawings, in which an embodiment of my invention is shown,

Figure 1 is a side elevation of a perforating machine embodying my invention;

Fig. 2 is a sectional view substantially on the line 2—2 of Fig. 3;

Fig. 3 is a part elevational, part sectional view of the machine substantially on the line 3—3 of Fig. 2;

Fig. 4 is an end view of the arbor assembly;

Fig. 5 is a plan view of the punch holder;

Fig. 6 is an exploded perspective view of one of the punch controlling rings;

Fig. 7 is a perspective view of a force block; and

Fig. 8 is a plan view of the arbor.

Referring now to the drawings in detail, the construction shown comprises a base or frame 1 having upper and lower spaced jaws 2 and 3, a die shoe 4 secured to this base in the space between the jaws, a punch holder 5 secured to the die shoe and held against lifting movement by engagement of bosses 6 on the upper jaw with the upper face of the punch holder, an arbor 7, a plurality of punch controlling rings 8 rotatably mounted on this arbor, a pair of index rings 9 between which the controlling rings 8 are mounted, a pair of combination cheek and lifter plates 10 for holding the rings in place on the arbor against lateral movement and for lifting the lifter plate 11, a pair of gib slides 12 secured to the cheek plates 10, respectively, and slidably mounted in vertical guideways 13 in the cheek members 14 of the base, a pair of force plates 15 for controlling certain of the punches, the cheek plates 10 and arbor 7 having registering openings, a pair of antifriction bearings 15a between which the arbor 7 and cheek plates 10 are arranged, means for reciprocating these bearings transversely of their axes to effect sliding movement of the gib slides 12 in the vertical guideways 13, and an actuating shaft 16 mounted in these bearings and extending through the registering openings in the cheek plate and arbor. As the gib plates 12 are rigidly secured to the cheek plates 10, they serve to hold the cheek plates against rotation. The cheek plates 10 are provided with positioning means, for holding the arbor 7 and index rings 9 against rotational movement, and also with positioning means for holding the force plates 15 against movement transversely of the axis of the arbor. These positioning means are readily engageable and disengageable by lateral movement of the cheek plates with respect to the arbor, index rings, and force plates. The positioning means for the force blocks 15 comprise laterally extending lugs 17 on the force blocks which engage correspondingly shaped holes in the cheek plates. The positioning means for preventing relative rotation between the cheek plates, the arbor 7 and index rings 9 comprise bosses 18 and 19 pressed up from the material of the cheek plates and engaging corresponding recesses in the lateral faces of the arbor and index rings.

With this construction, the assembly of the arbor, punch controlling rings, index rings, force blocks, and cheek plates, prior to placing the sub-assembly in position, may be accomplished by positioning one of the cheek plates on the arbor,

slipping one of the index rings 9 over the arbor and positioning it on the cheek plate, slipping the punch controlling rings over the arbor, placing one end of each of the force blocks 15 in position in the cheek plate, and slipping the other cheek plate into position on the arbor, so that the positioning means 18 and 19 on the cheek plate will engage the lateral recesses in the arbor and index ring, and so that the laterally extending bosses 17 on the force blocks will engage the corresponding holes in the cheek plate. This subassembly can then be placed between the cheek members 14 on the frame 1 of the machine, the lower ends of the gibs 12 on the cheek plates being entered into the vertical guideways 13 in the cheek members of the frame and the subassembly being slipped downwardly until the aligned central openings in the hub 20 of the arbor, the cheek plates 10, and gibs 12 are in alignment with the openings in the antifriction bearings 15a. The actuating shaft 16 is then inserted so as to extend through the registering openings in the antifriction bearings, gib slides, cheek plates, and arbors. The actuating shaft is then secured in place by means of washers 21 fitting against the ends of the antifriction bearings 15a and held in place by means of screws 22 threaded into the ends of the shaft.

For effecting the rectilinear up-and-down movement of the arbor assembly, the antifriction bearings 15a are mounted in bell crank members 23, one arm 24 of each bell crank being pivotally secured at 25 to one end of a swinging link 25a, the other end of which is rockably mounted on a fixed pivot pin 26 secured to a cheek member 14 of the frame, the other arm 27 of each bell crank being pivotally secured at 28 to one end of a link 29 secured at 30 to a crank 31 mounted on a rock shaft 32 which is actuated by the actuating lever 33 secured to this rock shaft.

In order to limit the up-and-down movement of the arbor assembly, a pin 34 is provided extending from one side of the frame to the other and secured thereto and extending through slots 35 in the actuating links 29. The engagement of the ends of these slots 35 with the pin or cross bar 34 determines the range of movement of the arbor assembly. In order to return the arbor assembly to its raised position, after the lever 33 has been moved downwardly and forwardly to effect the punching operation, a pair of coil tension springs 36 are provided, each having one end hooked over the cross bar 34 and the other end secured to a screw 37 extending through an ear 38 on the side of the link 29. This screw 37 may be adjusted to secure the desired tension in the spring 36 by means of a nut 39 threaded on the end of the screw and engaging the ear 38.

The connection between the lifter plate 11 and the lifter cheeks 10 is effected by means of downward extensions 40 on the lifter cheeks having inwardly turned fingers 41 on which the lifter plate rests and having also inwardly extending fingers 42 above the lifter plate for forcing it downwardly as the arbor moves downwardly. The lifter plate extends laterally on both sides beyond the sides of the upper punch guide 43, as shown in Fig. 3, so that the assembly of punch holder and die shoe can be slipped into place after the arbor assembly has been placed and secured in position in the frame.

The punch holder 5 is rigidly secured to the die 4 by means of screws 44 extending through the punch holder and threaded into the die shoe,

suitable dowels 45 being provided to position the parts definitely. The assembly of punch holder and die shoe is rigidly secured to the frame by means of screws 46 extending through openings in the die shoe and threaded into the frame. The two rear screws 46 extend through ears 47 extending laterally from the die shoe and are threaded into registering openings in ears 48 on the frame. These ears are located rearwardly of the punches out of the way of the hands of the operator in feeding papers to the machine.

In making the punch holder, a casting is made having a pocket 49 in its upper side, into which melted babbitt may be poured. In making the casting in which the pocket 49 is formed, a slight upward flare of the pocket has to be made in order that the pattern used in making the mold may be readily withdrawn from the mold used in making the casting. In order to hold the melted babbitt in this outwardly flaring pocket, anchorage means must be provided which holds the babbitt in the pocket. For this purpose a number of screws 50 are threaded into tapped holes in the punch holder so that when the babbitt 51 is poured into the pocket, the heads of these screws will be held in the babbitt and will hold the babbitt firmly in place when it solidifies. Before pouring the babbitt into the pocket, the bottom 52 of the pocket is drilled, as at 53, to provide properly arranged guides for the punches 54. Also, before pouring the babbitt, pins are inserted into these drilled holes and the babbitt is poured around the pins. After the babbitt solidifies, the pins are withdrawn, leaving the aligned opening in the babbitt and bottom of the punch holder. These holes are then reamed out slightly to provide a smooth bearing for the punches which are thereafter inserted. The punches themselves are provided with enlargements 55 which are engaged by the lifter plate 11 for raising the punches as the plate is raised. A suitable receptacle 56 is provided in the bottom of the frame to receive the punchings which are forced through the holes in the die plate 57 and fall down through the openings 58 into this box.

The arbor 7 on which the rings 8 and 9 are mounted is made of a single casting having central hub portions 20 through which the actuating pin 16 extends and having a cylindrical peripheral portion 59 connected with the hub portion by suitable webs or spokes 60. The cylindrical peripheral portion 59 is provided with a series of circumferentially spaced parallel troughs 61 in its outer surface extending longitudinally of the axis of the arbor, and each of the punch controlling rings 8 carries a spring-pressed detent successively engageable with said troughs 61 for retaining the rings in their desired adjusted position to bring the desired portion of the punch controlling ring in registration with the set of punches controlled thereby. Each of these spring-pressed detents comprises a roller 62 having spaced roller portions 63 for engagement with the troughs 61, and a neck portion 64 connecting these roller portions, forced toward the grooves in the arbor by means of a wire spring 65 mounted in the ring 8. This wire spring comprises two connected coil torsion springs 66 and a portion 67 extending from each torsion spring engaging the neck portion 64 of the roller. Each ring comprises a main portion 68 recessed at 69 to receive the spring and notched at 70 to receive one roller portion 63, and an arcuate portion 71 secured to the main portion and covering

the spring recess 69 and notched at 72 to receive the other roller portion 63. The spring is held in place in the recess by means of a pair of pins 73 extending from the main ring portion into openings 74 in the arcuate covering portion. This covering portion may, for convenience in manufacture, be made up of a number of laminations and may be secured to the main ring portion by means of pins 75 extending through holes 76 in these laminations and into registering holes in the main ring portion.

The punch controlling rings 3 may be used with the central set of punches for selectively controlling these punches to produce different characters. The force plates 15 may be used to control the front and rear sets of punches which do not in general have to be selectively controlled. For example, the central set of punches may be used for dates which have to be changed from time to time, and the front and rear sets of punches which are not as a rule changed may be used for making "paid" perforations, or the like.

As indicated above and as shown in Fig. 3, the two outermost rings 9 on the arbor may be indexed rings, as distinguished from punch control rings, and may be held against rotation with respect to the arbor by means of projections on the cheek plates extending into holes in the index rings. The index rings may be provided with indicia with which the figures or characters on the punch controlling rings may be aligned transversely to secure the proper positioning of the punch controlling perforations in the rings.

In order to limit the movement of the punch controlling rings, a stop bar 77 is provided, secured to ears 78 extending upwardly from the cheek plates. This bar is engageable by the operating pins or handles 79 on the rings to limit the range of movement of the rings in one direction. The movement of the rings in the opposite direction is limited by the engagement of the pins 79 with the upper edge 80 of the force plate 15.

In order to prevent possible tipping of the frame when the lever 33 is moved downwardly to effect a perforating operation, the front foot 81 of the base on the operating lever side of the machine may extend laterally some distance so that the base will be supported on both sides of the plane of travel of the lever.

As indicated above, in assembling the machine, the punch holder and die set assembly may be put together and the arbor assembly may be put together and mounted in the frame, and the punch holder and die assembly may then be put in place in the frame, the lifter plate 11 sliding into place between the lower lifting fingers 41 and the upper depressor fingers 42. Suitable cover plates 82 may be provided for enclosing the bell cranks 23 and links 25a.

In operation, the punch controlling rings are moved to the desired position by means of the pins 79 to select the proper punches for operation, the positioning detents riding into and out of the grooves 61 as the rings are rotated on the arbor. The pad of sheets to be perforated is inserted into the space between the punch holder 5 and the die plate 51. The actuating lever is then moved downwardly and forwardly until the upper edge of the slot 35 strikes against the crossbar 34. This causes a rectilinear downward sliding movement of the gibs 12 in the vertical

guideways. This moves the gib-carrying cheek plates 10 downwardly, carrying with them the arbor, punch controlling rings, and force plates. This effects the desired operation of the punches. It will be noted that the movement of the punch controlling rings and force plates is a rectilinear movement longitudinally of the punches so that there is no skewing or side thrust of the punches. After the punching operation has been performed, the lever is released, whereupon the coil tension springs 36 pull on the links 29 until the lower edges of the slots 35 engage the crossbar 34. This will raise the arbor assembly and punches, ready for another operation. In the operation of the bell crank lever 23, the bell crank fulcrums about the axis of the shaft 16 on which the arbor 7 is mounted, and as this shaft is mounted in the rectilinearly movable cheek plates 10, the movement of the actuating shaft 16 is also a rectilinear movement transversely of its axis. In this vertical movement of the fulcrum of the bell crank, the link 25a, which is pivotally connected to the lower arm 24 of the bell crank, will rock slightly about its fixed pivot to allow the vertical movement of the shaft 16.

Further modifications will be apparent to those skilled in the art and it is desired, therefore, that the invention be limited only by the scope of the appended claims.

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

1. A perforating machine comprising a punch holder, a plurality of punches slidably mounted in said holder, a lifter plate for said punches, an arbor, a plurality of punch-controlling rings rotatably mounted on said arbor, a pair of combination cheek plates and plate-lifter members for holding said rings against lateral movement on said arbor and for lifting the lifter plate, a pair of gib slides secured to said cheek plates, respectively, rectilinear guides for said slides, a force plate for controlling certain of said punches, said cheek plates and arbor having registering openings, a pair of bearings between which the arbor and cheek plates are arranged, means for reciprocating said bearings transversely of their axes, and an actuating shaft mounted in said bearings and extending through said registering openings, said gib plates serving to hold the cheek plates against rotation and axial movement, said cheek plates having positioning means for holding the arbor against rotational movement and having positioning means for holding the force plate against transaxial movement, said positioning means being readily engageable and disengageable by lateral movement of the cheek plates with respect to said arbor and force plate.

2. A perforating machine comprising a punch holder, a plurality of punches slidably mounted in said holder, a hollow cast arbor having a central hub portion and a cylindrical peripheral portion spaced from said hub portion and supported thereby, an actuating shaft extending through said hub portion and reciprocable transversely of its axis for effecting movement of the arbor, and a plurality of punch controlling rings rotatably mounted on said arbor, said arbor having a series of circumferentially spaced parallel troughs in its outer surface extending longitudinally of the axis of the arbor, each ring carrying a spring-pressed detent successively engageable with said troughs, and said arbor being provided with a groove in its outer periphery extending longitudinally of the axis of the arbor for receiving the

ends of the punches which have passed through the rings.

3. An arbor and ring assembly for a perforating machine comprising a cylindrical arbor and a punch controlling ring rotatably mounted thereon, said arbor having a series of circumferentially spaced parallel notches in its outer surface, said ring carrying a spring-pressed detent successively engageable with said notches, said detent comprising a roller having spaced roller portions for engagement with said notches and a neck portion connecting said roller portions, and a spring engaging said neck portion, said ring having an inwardly opening notch for guiding the roller portions in their radial movement.

4. An arbor and ring assembly for a perforating machine comprising a cylindrical arbor and a punch controlling ring rotatably mounted thereon, said arbor having a series of circumferentially spaced parallel notches in its outer surface, said ring carrying a spring-pressed detent successively engageable with said notches, said detent comprising a roller having spaced roller portions for engagement with said notches and a neck portion connecting said roller portions, and a spring engaging said neck portion, said ring having an inwardly opening notch for guiding the roller portions in their radial movement and being recessed to receive said spring.

5. An arbor and ring assembly for a perforating machine comprising a cylindrical arbor and a punch controlling ring rotatably mounted thereon, said arbor having a series of circumferentially spaced parallel notches in its outer surface, said ring carrying a spring-pressed detent successively engageable with said notches, said detent comprising a roller having spaced roller portions for engagement with said notches and a neck portion connecting said roller portions, and a spring engaging said neck portion, said ring having an inwardly opening notch for guiding the roller portions in their radial movement and being recessed to receive said spring, said spring comprising a wire bent to form two connected coil torsion springs, and a portion extending from each torsion spring engaging the neck portion of a roller.

6. An arbor and ring assembly for a perforating machine comprising a cylindrical arbor and a punch controlling ring rotatably mounted thereon, said arbor having a series of circumferentially spaced parallel notches in its outer surface, said ring carrying a spring-pressed detent successively engageable with said notches, said detent comprising a roller having spaced roller portions for engagement with said notches and a neck portion connecting said roller portions, and a spring engaging said neck portion, said ring having an inwardly opening notch for guiding the roller portions in their radial movement and being recessed to receive said spring, said spring comprising a wire bent to form two connected coil torsion springs, and a portion extending from each torsion spring engaging the neck portion of a roller, said ring comprising a main portion recessed to receive the spring and notched to receive one roller portion, and a ring portion secured to said main portion covering the spring recess and notched to receive the other roller portion.

7. A perforating machine comprising a punch holder, a plurality of punches slidably mounted in said holder, an arbor, a plurality of punch controlling rings rotatably mounted on said arbor,

movable bearing means on which said arbor is mounted comprising a shaft extending through and coaxial with said arbor, means for guiding said arbor and shaft for rectilinear movement toward and from the punches, and means for effecting the rectilinear movement of said shaft comprising a pair of bell crank levers on opposite sides of said arbor having their intermediate portions fulcrumed about the axis of said shaft, a pair of links, each having one end rockable about a fixed axis and its other end pivotally secured to an arm of one of said bell cranks, and a pair of links, one pivotally secured to each of the other arms of said bell cranks.

8. A perforating machine comprising a punch holder, a plurality of punches slidably mounted in said holder, an arbor, a plurality of punch controlling rings rotatably mounted on said arbor, movable bearing means on which said arbor is mounted comprising a shaft extending through and coaxial with said arbor, means for guiding said arbor and shaft for rectilinear movement toward and from the punches, and means for effecting the rectilinear movement of said shaft comprising a pair of bell crank levers on opposite sides of said arbor having their intermediate portions fulcrumed about the axis of said shaft, a pair of links, each having one end rockable about a fixed axis and its other end pivotally secured to an arm of one of said bell cranks, a pair of links, one pivotally secured to each of the other arms of said bell cranks, and means for actuating said last pair of links comprising a rock shaft and an actuating lever secured to said rock shaft.

9. A perforating machine comprising a punch holder, a plurality of punches slidably mounted in said holder, an arbor, a plurality of punch-controlling rings rotatably mounted on said arbor, a pair of cheek plates for holding said rings against lateral movement on said arbor, a pair of gib slides secured to said cheek plates, respectively, rectilinear guides for said slides, said cheek plates and arbor having registering openings, a pair of bearings between which the arbor and cheek plates are arranged, means for reciprocating said bearings transversely of their axes, and an actuating shaft mounted in said bearings and extending through said registering openings, said gib plates serving to hold the cheek plates against rotational and axial movement, said cheek plates having positioning means for holding the arbor against rotational movement, said positioning means being readily engageable and disengageable by lateral movement of the cheek plates with respect to said arbor.

10. A perforating machine having upper and lower relatively stationary jaws, a punch holder and die shoe assembly fitting snugly between said jaws, said punch holder and die shoe assembly having an open sheet-receiving throat between the punch holder and die shoe and having engaging faces in the rear of the rear end of the throat, and means in the rear of the rear end of the throat for clamping the punch holder and die shoe together, said upper jaw engaging said punch holder forwardly of the rear of said throat.

11. A perforating machine having upper and lower relatively stationary jaws, a punch holder and die shoe assembly fitting snugly between said jaws, said punch holder and die shoe assembly having an open sheet-receiving throat between the punch holder and die shoe and having engaging faces in the rear of the rear end of the throat, means in the rear of the rear end of the

throat for clamping the punch holder and die shoe together, said upper jaw engaging said punch holder forwardly of the rear of said throat, means for securing said die shoe to the lower jaw comprising lugs extending laterally from the die shoe below the plane of the throat and in the rear of the rear end of the throat, and fasteners extending through said lugs and secured to the lower jaw.

12. An arbor and ring assembly for a perforating machine comprising a single casting including a cylindrical hollow shell, hubs at opposite ends of the shell and spokes connecting the hubs with the hollow shell, said shell having a series of circumferentially spaced parallel troughs in its outer surface extending longitudinally of the axis of the cylindrical shell, and a plurality of punch-controlling rings rotatably mounted on said shell, each ring carrying a spring-pressed detent successively engageable with said troughs.

13. An arbor and ring assembly for a perforating machine comprising a single casting including a cylindrical hollow shell, hubs at opposite ends of the shell and spokes connecting the hubs with the hollow shell, said shell having a series of circumferentially spaced parallel troughs in its outer surface extending longitudinally of the axis of the cylindrical shell, and a plurality of punch-controlling rings rotatably mounted on said shell, each ring carrying a spring-pressed detent successively engageable with said troughs, said shell being provided with a groove in its outer periphery extending longitudinally of the axis of the arbor for receiving the ends of the punches which have passed through the ring.

14. A perforating machine comprising a punch holder, a plurality of punches slidably mounted in said holder, an arbor, a plurality of punch controlling rings rotatably mounted on said arbor, movable bearing means on which said arbor is mounted comprising a shaft extending through and coaxial with said arbor, means for guiding said arbor and shaft for movement toward and from the punches, and means for effecting the movement of said shaft comprising a pair of bell crank levers on opposite sides of said arbor having their intermediate portions fulcrumed about the axis of said shaft, a pair of links, each having one end rockable about a fixed axis and its other end pivotally secured to an arm of one of said bell cranks, and a pair of links, one pivotally secured to each of the other arms of said bell cranks.

15. A perforating machine comprising a punch

holder, a plurality of punches slidably mounted in said holder, an arbor, a plurality of punch controlling rings rotatably mounted on said arbor, movable bearing means on which said arbor is mounted comprising a shaft extending through said arbor, means for guiding said arbor and shaft for movement toward and from the punches, and means for effecting the movement of said shaft comprising a pair of bell crank levers on opposite sides of said arbor having their intermediate portions fulcrumed about the axis of said shaft, a pair of links, each having one end rockable about a fixed axis and its other end pivotally secured to an arm of one of said bell cranks, and a pair of links, one pivotally secured to each of the other arms of said bell cranks.

16. A perforating machine comprising a punch holder, a plurality of punches slidably mounted in said holder, an arbor, a plurality of punch controlling rings rotatably mounted on said arbor, movable bearing means on which said arbor is mounted comprising fulcrums extending laterally from the ends of said arbor, means for guiding said arbor and fulcrums for movement toward and from the punches, and means for effecting the movement of said shaft comprising a pair of bell crank levers on opposite sides of said arbor having their intermediate portions fulcrumed on said fulcrums, a pair of links, each having one end rockable about a fixed axis and its other end pivotally secured to an arm of one of said bell cranks, and a pair of links, one pivotally secured to each of the other arms of said bell cranks.

17. A perforating machine comprising a punch holder, a plurality of punches slidably mounted in said holder, an arbor, a plurality of punch controlling rings rotatably mounted on said arbor, movable bearing means on which said arbor is mounted comprising a fulcrum extending laterally from an end of said arbor, means for guiding said arbor and fulcrum for movement toward and from the punches, and means for effecting the movement of said shaft comprising a bell crank lever on one side of said arbor having its intermediate portion fulcrumed on said fulcrum, a link having one end rockable about a fixed axis and its other end pivotally secured to an arm of one of said bell crank levers, and a link pivotally secured to the other arm of said bell crank lever.

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