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TOY PUNCH MACHINE

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This invention relates to toys and more particularly to toy punch machines by the use of which a child can punch a series of small holes or perforations in pieces of paper, patches of cloth, sheets of thin plastic or the like, and the primary object of the present invention is to provide an improved device of this character.

Another object of the invention is to provide an improved toy punch machine of a type that can be manufactured mostly from molded plastics or similar materials.

A further object of the invention is to provide a lightweight toy punch machine which can be used to instruct a child in the performance of operations similar to those performed while using a sewing machine.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby, will be readily understood by those skilled in the art.

In the drawings:

FIG. 1 is a longitudinal vertical sectional view taken substantially on a plane bisecting a toy punch machine embodying the present invention, and showing one half of the machine with the punch operating mechanism installed therein;

FIG. 2 is a vertical sectional view similar to FIG. 1 but showing the other half of the machine without the punch operating mechanism,

FIG. 3 is a transverse vertical sectional view taken substantially on the line 3-3 of FIG. 1 and showing both halves of the machine,

FIG. 4 is a vertical sectional view taken on the line 4-4 of FIG. 1 and showing both halves of the machine,

FIG. 5 is a fragmentary sectional view taken on the line 5-5 of FIG. 1, and

FIG. 6 is a sectional view taken on the line 6-6 of FIG. 1.

The main body of the top punch machine illustrated in the accompanying drawings is made of molded plastic or other similar material and the machine is formed in two substantially equal halves defined as a front half frame portion 16 and a rear half frame portion 17. The front half frame portion 16 (FIG. 2) is formed with a bed 21 provided with an end wall 22, a work supporting surface 23, an upright standard 24, a wheel socket or guard 26, an overhanging bracket arm 27 terminating in a head 28, and a pair of suction cups 29-29 are secured to the bottom of the bed 21. The rear half frame portion 17 (FIG. 1) is formed with a bed 31 provided with an end wall 32, a work supporting surface 33, an upright standard 34, a wheel guard 36, an overhanging bracket arm 37 terminating in a head 38, and a pair of suction cups 39-39 are secured to the bottom of the bed 31.

The wheel guard 26 (FIG. 2) is formed with an off-center bearing 41 and the end wall 22 is formed with a bearing 42. Intermediate the wheel guard 26 and the end wall 22 there are formed a plurality of vertical ribs, two of these ribs being designated by the numerals 43 and 44 and these ribs 43 and 44 are respectively formed with bearings 46 and 47. Also, the wheel guard 26 is formed with a centrally located bearing 48 and internally of the standard 24 there is formed a post 51 having a bearing 52. Internally of the bracket arm 27, there is formed a hollow cylindrical post 53 having a reduced end 54. The bottom of the head 28 is formed with a slideway 56 and internally of the head 28 there is formed a post 57, the end of which is provided with a slideway 58. A bar 59 protrudes from one face of the rib 44 and terminates in a curved end 60.

The wheel guard 36 (FIG. 1) is formed with an off-center bearing 61 and the end wall 32 is formed with a bearing 62. Intermediate the wheel guard 36 and the end wall 32 there are formed a plurality of vertical ribs, two of these ribs being designated by the numerals 63 and 64 and these ribs 63 and 64 are respectively formed with bearings 66 and 67. Also, the wheel guard 36 is formed with a centrally located bearing 68 and internally of the standard 34 there is formed a post 71 having a bearing 72. Internally of the bracket arm 37, there is formed a cylindrical post 73 having a socket 74. The bottom of the head 38 is formed with a slideway 76 and internally of the head 38 there is formed a post 77, the end of which is provided with a slideway 78. A bar 79 protrudes from one face of the rib 64 and terminates in a curved end 80.

It will be understood that the two half frame portions 16 and 17 are placed together in such a manner as to form the complete frame or body of the toy punch machine having matching bearing and matching slideways. In order to accomplish this, the two frame portions are formed with beveled matching edges. As best seen in FIGS. 3 and 4, the front frame portion 16 is formed with an internal beveled edge 81 and the rear frame portion 17 is formed with an external beveled edge 82. Also, the previously mentioned socket 74 receives the end 54 of the post 53. The edges 81 and 82 and the socket 74 and end 54 interlock and may be joined by adhesive to hold the two half frame portions 16 and 17 in proper relationship.

The operating mechanism of the toy punch machine is positioned mostly between the two frame portions 16 and 17 and includes a handwheel 87 carried on a handwheel shaft 88 which is rotatably supported between matching bearings 48 and 69 on one end and matching bearings 52 and 72 on the other end. The shaft 88 is held from endwise movement by means of a Truarc clamp ring 89 which abuts the post 71 adjacent to the bearings 52-72. The handwheel 87 is turned by means of a handle 91 and an internal gear 92 formed inside of the handwheel 87 drives a pinion 93 formed on one end of a main or cam shaft 94, the cam shaft 94 being rotatably mounted in the matching bearings 41-61, 46-66, 47-67 and 42-62. The cam shaft 94 is formed in two parts, telescoping one another at 95, and the shaft 94 is held in endwise position by means of two Truarc clamp rings 97 and 98, the ring 97 engaging the ribs 43-63 adjacent to the bearing 46-66 and the ring 98 engaging the ribs 44-64 adjacent to the bearing 47-67. As best seen in FIG. 3, the shaft 94 is formed with an eccentric 101 which carries a feed dog 102, the upper end of which projects through feed dog slots formed in the working supporting surfaces 23 and 33, and the upper end of the feed dog 102 is capped with a pad 103 made of leather, rubber or the like material, which material provides a friction surface on the upper end of the feed dog 102. The lower end of the feed dog 102 is positioned between the ends 69 and 80. As best seen in FIG. 1, the shaft 94 is formed with a socket used which carries one end of a pitman 106, the other end of which is formed with a hole 107 which receives one end of a rock lever 108 which is pivotally mounted on the reduced end 54 of the post 53. The rock lever 108 (FIG. 4) is apertured and is thereby pivotally mounted on the end 54 between the large post 53 and the small post 41. The other end of the lever 108 (FIGS. 1 and 3) enters a slot 109 formed in the upper end of the punch bar 111.
which is slidably received at its upper end in the matching slideway 58-78 and at its lower end in the matching slideway 56-76. A helical compression spring 116 surrounds the punch bar 111 between the end of the lever 108 and the upper surface of the bottom of the head 38 and the spring 116 biases the punch bar 111 and the end of the lever 108 upwardly. The lower end of the punch bar 111 carries a chisel or punch 117 which, when it enters a punch receiving hole formed by openings 118 and 120 located respectively in the work support surfaces 23 and 33, is able to punch a hole in a piece of paper, a patch of cloth or a sheet of thin plastic. Secured to the rear surface of the head 38 by a screw 119 is the upper end of a J-shaped spring presser foot 122 which presses on the work supporting surfaces 23 and 33 and the pad 103 of the feed dog 102. Of course, as the hand 91 is turned, the shaft 94 turns, the platen 106 reciprocates, the lever 108 rocks and the punch bar 111 and punch 117 move up and down to punch a succession of holes or perforations in material (not shown) placed on the work support surfaces 23 and 33. At the same time the eccentric 101 turns to operate the feed dog 102 to feed the material (not shown) away from the operator. Turning of the eccentric 101 causes the upper surface of the pad 103 to perform the well-known four-motion feed movement. As the eccentric 101 turns, the feed dog 102 moves up and down. Also as the eccentric 101 turns, that portion of the feed dog 102 adjacent to the eccentric 101 moves horizontally (FIG. 3) from right to left and from left to right. However, as previously stated, because the lower end of the feed dog 102 is positioned between the ends 80 and 60, the lower end of the feed dog 102 is restrained from horizontal movement. And, because of the fulcrum action of the ends 80-60, the right to left and left to right movements of the pad 103 are exaggerated. Thus, the pad 103, as seen in FIG. 3, performs the following well-known four-motion feeding movement. When the feed dog 102 is raised, the pad 103 moves from right to left (FIG. 3). When this movement has been completed, the pad 103 drops below the upper surface of the supports 33-23 and, as the eccentric 101 continues to turn, the pad 103 executes a left to right movement in a position below and out of contact with the paper or other material being fed over the surfaces 33-23. Then, as the eccentric 101 continues to turn, the pad 103 rises to contact the paper to feed the same. At this point the pad 103 begins its next horizontal feeding movement in the manner described above, and as the eccentric 101 reciprocates, the punch 117 forms a series of holes or perforations in the material being fed. It will of course be understood that the telescoping parts 96 of the shaft 94 are joined in such a manner, as for example by glue or other means, so that the two parts of the shaft 96 will turn as one shaft.

Having thus set forth the nature of this invention, what we claim herein is:

1. A toy reciprocating machine comprising in combination,
   (A) a pair of mating half frames each comprising in turn,
      (1) a bed,
      (2) an upright standard rising from each of said beds,
      (3) an overhanging bracket arm secured to each of said standards, each of said bracket arms having formed internally thereof coupling posts for interengaging one another,
      (4) a head formed on the free end of each of said bracket arms,
      (5) means for engaging said two half frames;
   (B) operating mechanism comprising in combination,
      (1) a handwheel rotatably carried by said mating half frames,
      (2) a main cam shaft driven by said handwheel,
      (3) a rocking lever pivotally mounted on at least one of said coupling posts and rocked by said main cam shaft,
      (4) a reciprocating member operated by said rocking lever,

2. A toy reciprocating machine comprising in combination,
   (A) a pair of mating half frames each comprising in turn,
      (1) a bed having a plurality of wall members each having a half bearing formed therein and a bar protruding from the face of two of said wall members and each of said bars having a curved end,
      (2) an upright standard rising from each of said beds,
      (3) an overhanging bracket arm secured to each of said standards,
      (4) a head formed on the free end of each of said bracket arms,
      (5) means for engaging said two half frames;
   (B) operating mechanism comprising in combination,
      (1) a handwheel rotatably carried by said mating half frames,
      (2) a main cam shaft driven by said handwheel,
      (3) a rocking lever rocked by said main cam shaft,
      (4) a reciprocating member operated by said rocking lever,
      (5) an eccentric formed on one end of said main cam shaft,
      (6) a feed dog carried on said eccentric and having its lowermost end positioned between said curved ends whereby when said main cam shaft operates the rounded ends of said bars prevent sidewise movement of the lower end of said feed dog and causes said feed dog to feed.
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4. A toy reciprocating machine comprising in combination,
(A) a pair of mating half frame portions each comprising in turn,
(1) a bed having,
(b) an apertured work supporting surface,
(2) an upright standard rising from said beds and each standard being formed with half bearings,
(3) an overhanging bracket arm secured to each of said standards, said bracket arms having coupling posts formed internally thereof,
(4) a head formed on the free end of each of said bracket arms and formed with half slideways,
(5) means for engaging said two half frame portions;
(B) operating mechanism comprising in turn,
(1) a handwheel having driving means and said handwheel being rotatably supported by said half bearings on said upright standards,
(2) a main cam shaft rotatably mounted by said half bearings of said plurality of wall means,
(a) a pinion carried on one end of said main cam shaft and driven by the driving means of said handwheel,
(3) an eccentric formed on one end of said main cam shaft,
(4) a feed dog carried on said eccentric and having its lowermost end positioned between the ends of said bar protruding from said wall members,
(5) a second eccentric formed on said main cam shaft,
(6) a pitman having an opening at one end by which it is carried on said second eccentric and having a hole at its other end,
(7) a rock lever pivotally mounted on said coupling posts of said overhanging bracket arm,
(8) a reciprocating bar having in its upper end a hole for receiving one end of said rock lever for reciprocating said bar and said bar being slidably carried in the mating half slideways formed in said head.

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