J. D. REIFSNYDER.
THUMB HOLE CUTTING MACHINE.
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Fig. 1.

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By his Attorney

Witnesses:
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3 SHEETS-SHEET 1.
To all whom it may concern:

Be it known that I, JAMES D. REIFSNYDER, a citizen of the United States, residing at Philadelphia, in the State of Pennsylvania, have invented new and useful Improvements in Thumb-Hole-Cutting Machines, of which the following is a specification.

This invention relates to a machine designed especially for cutting the thumb holes in paper box covers, particularly those covers that inclose the entire box and extend down to or nearly to the bottom thereof.

The object of the invention is to provide a light, strong, and compact machine for the purpose designed, which may be driven optionally by foot, belt or motor power; which is readily adjustable to operate on many different sizes of covers without disconnecting any of the operating mechanism, and which may be moved from one place to another without effort. The cutter-heads are interchangeable with other cutter heads having punches or cutters of different sizes or shapes mounted therein when thumb holes of other sizes or different configurations are desired. The box cover support is adjustable vertically to vary the depth of cut, and the frame carries an adjustable gage which may be set to correctly position any cover not too large for the machine.

An important feature of the invention resides in the actuator member for imparting power and motion from any of the heretofore mentioned sources of power to the movable punches. This member is so constructed as to have continuous engagement with the connectors that reciprocate the punches, irrespective of whether they are set to cut large, small or intermediate sizes of box covers. The cutter heads besides supporting the punches and the dies therefor, have also mounted thereon the operators for said punches, which operators have each a sliding engagement with the actuator member. The heads are movable in guides to any distance within the length of the machine, it being only necessary to loosen a thumb nut on each head, slide the heads to the desired points, and then tighten the nuts when the machine will be ready for operation.

To render this invention so clear that it may be made and used by those skilled in the art, attention is directed to the following detailed description and claims in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a machine made in accordance with this invention, a portion of the same being shown in section. Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1. Fig. 3 is a top plan view, one of the cutter heads being broken away to more clearly illustrate certain features of the invention. Fig. 4 is a perspective view showing a product of the machine.

In the drawing 10 indicates a flat horizontal table of greater dimensions laterally than from front to rear and provided with an opening 11 therethrough extending from side to side, the edges of said opening being provided with guide ways 12. The plate 10 is supported on upright legs 13 at each end connected together at the bottom by a traverse bar or bars 14, for preventing the legs spreading, and mounted on small wheels 15 by means of which the machine may be moved from place to place.

Slidable on the guide ways 12 are two cutter heads 16 and 17, which project a short distance through the opening 11 in the table 10 and are each provided with a clamping screw 18 having a hook 19 on its lower end which extends laterally below one of the guide ways, and a thumb nut 20 on its upper end by means of which said cutter heads are secured in adjusted position, and which when loosened will permit the heads to be moved longitudinally on said guide ways. Mounted to slide longitudinally in bearings in the heads 16 and 17 are cutters or punches 21, each having a lateral notch 22 in one side to receive the circular head 23 of an elbow lever or operator 24, each pivoted mounted at its angle on a bracket 25 depending from the under side of the respective cutter heads.

Below the table 10 is an actuator 26 for imparting longitudinal motion to the cutters or punches 21, said actuator in the present instance, comprising a hub 27 extending between the legs 13 and journeled on bolts 28 threaded in said legs to permit said actuator to rock. Extending in a forward direction from the hub 27 is a plate 29 expanded vertically at its forward edge in which is made a horizontal slot 30, said plate extending nearly to the ends of the hubs, as shown in Fig. 1. The actuator member shown and described as rocking on pivots, may if de-
sired, be mounted to reciprocate in a straight
time, the motion imparted thereby being the
same whether it rocks or reciprocates. Eng-
gaging said slot are headed pins 30, each
mounted on the free end of an elbow lever
24, the connection being such that into whatever
position said heads may be moved to
increase or decrease the distance between the
cutters to accommodate box covers of various
sizes, the elbow levers 24 will move ther-
with, and the headed pins 30 sliding in the
slot 29 will always retain connection with
the actuator, thus doing away with the ne-
cessity of disconnecting and reconnecting
various parts of the mechanism, each time
an adjustment is to be made to the cutter
heads.

Supported by a bracket shelf 31 secured
to one of the legs 13 on its inner side is a
bearing 32 within which is mounted a hori-
tzontal rotating shaft 33 extending trans-
versely of the machine and provided with a
worm 34 which engages and rotates a worm
35 mounted on a shaft 36 turning in
arms projecting upwardly from the bearing
32. The shaft 36 also carries a cam 37
which operates an arm 38 projecting from
the hub 27 of the actuator. At each rota-
tion of the shaft 36 the cam 37 vibrates the
arm 38, which imparts a like movement to
the plate 29 of the actuator, rocks the elbow
levers 24, and these in turn cause the cutters
or punches 21 to operate. The shaft 33 may
be rotated by an electric motor 39 supported
on the bracket shelf 31 and connected directly
to said shaft or a belt pulley 40 may be
mounted on an extension of the shaft 33 and
a clutch provided for engaging and dis-
gaging said pulley to the shaft. A further
means for operating the actuator is also
shown, this means comprising a treddle 41
riveted to rock on the brace rod 14 and con-
ected by a pitman 42 to the under side of
the actuator. A coil spring 43 connected to
the pitman and the under side of the table,
or any other convenient position returns the
several parts to inoperative position after
being actuated either by the cam or by the
treadle.

At the inner side of each cutter head 16, 17
is a vertically disposed yoke 44 which yokes
extend across said cutter heads and are slid-
ably mounted in grooves 45 in their front
and rear sides. Projecting from the lower
ends of the legs 46 of the yokes 44 are sup-
porting shelves 47 on which the box covers
are placed, said shelves projecting both in
front of and back of the cutter heads a suffi-
cient distance to give firm support to the
box covers. A thumb screw 48 extends
together the top of each yoke 44 and into
the respective cutter heads for the purpose
of raising and lowering the shelves 47 to
increase and decrease the depth of cut to be
made in the box covers.

Screwed or otherwise fastened in vertical
position to the inner ends of each cutter
head 16, 17 is a die plate 49 through which
is formed a hole 50 of the same size and
shape as the punch or cutter 21, and against
which said punch or cutter bears when mak-
ing a cut in the box cover. Between each
die plate 49 and the cutter heads is a space
51 to receive the edges of the box top as they
are placed upon the shelves and for prevent-
ing lateral movement thereof.

Guide 52 indicates an adjustable guide mounted
to slide transversely in a groove 53 in the
top of the table 10, and is held in any de-
sired position by a thumb nut 54. The for-
ward end of the guide 52 has an upturned
finger 55 that projects above the supporting
shelves 47 and against which the rear of the
box cover is placed when positioned to have
the thumb holes cut therein.

In operation the thumb nuts 21 are
loosened and the cutter heads 16 and 17
moved toward or from each other until the
distance between the spaces 51 is equal to
the width of the box top, after which said
nuts are tightened. This movement besides
moving the cutter heads also causes the
elevator levers 24 to move and the headed pins
carried thereby to slide in the slot 29 of the
actuator. The guide 52 is then moved into
such a position that when a box is placed in
position and against the finger 55 therein
it will be properly positioned for the punches
or cutters when they advance to cut from the
dge of said boxes thumb holes a as indicated in
Fig. 4. The depth of cut is regulated by turning the screw bolts 48 which raise and lower the supporting
shelves 47.

The cutter heads, supporting shelves, and
guide being properly adjusted the shaft 33
may be started either by switching in the
electric motor 39, or coupling the clutch to
the belt pulley 40 if power is used. If the
treddle is to be used the same will be oper-
ated after each box cover has been placed in
position. When power is used there is suffi-
cient time between each operation of the cam
37 to permit one box cover being removed
and another substituted in place thereof, so
that the operation will be continuous.

If desired the cam 37 instead of being a
single cam to cause one operation of the
actuator at each rotation of the shaft 36,
may be a double cam as indicated in dotted
lines Fig. 2, whereby two operations of the
machine will occur at each rotation of said
shaft. Instead of making the punches or
cutters circular as shown they may be tri-
angular, square, or of any other formation
desired.

What I claim is:

1. A thumb hole cutting machine compris-
ing a plurality of adjustable cutter heads,
a cutting punch slidably mounted in each
head, a pivoted actuating member for positively moving said cutting punches in each direction, and means supported by each head for conveying motion from said actuating member to the punches, said means having continuous interengaging but movable connection with the actuator to permit adjustment of said cutter heads without disconnecting any of the operating parts.

2. A thumb hole cutting machine comprising a plurality of adjustable heads, a cutting punch slidably mounted on each head, a punch operator supported on each head and adjustable therewith, and a pivoted actuating member for positively operating the said punch operators and their cooperating punches in each direction, said operators having a sliding connection with the actuators to permit adjustment of the heads within the limit of the machine without disconnecting said connection.

3. A thumb hole cutting machine comprising a plurality of adjustable heads, a cutting punch slidably mounted on each head, a plurality of supports for the article to be cut, each adjustable mounted on a head and also adjustable with the head, a punch operator carried by each head and movable therewith, and a pivoted actuating member for imparting movement to said punch operators, said operators having a sliding connection with the actuators to permit adjustment of said heads without disengaging any of the connections.

4. A thumb hole cutting machine comprising a plurality of adjustable heads, a cutting punch slidably mounted in each head, a bell crank operating lever pivoted on each head and connected by one arm to the cutting punch to move the same positively in each direction, a pivoted actuating member having a slot therein, and means on the other arm of each punch operating lever in sliding engagement with said slot to rock said levers and permit adjustment of the cutter heads without disconnecting any of the parts.

5. A thumb hole cutting machine comprising a plurality of adjustable heads, a cutting punch slidably mounted in each head, a pivoted actuating member comprising a rocking plate having a slot in its swinging edge, and a bell crank operating lever mounted on each head connected by one arm to the cutting punch to move the same positively in each direction and having sliding engagement by its other arm with the slot in the actuating member to permit adjustment of the cutter heads without disconnecting the lever and actuating member.

6. A thumb hole cutting machine comprising a fixed table, a plurality of adjustable cutter heads slidable on said table and extending through a slot therein, a pivoted actuating member supported below said table and having a straight slot therein parallel to the line of movement of said cutter heads, means for rocking the actuating member, and means on each head for conveying the motion in both directions of said actuating member to the punches, said means having continuous but movable connection with the actuator to permit adjustment of said heads.

7. A thumb hole cutting machine comprising a fixed table having a longitudinal slot therein, a pair of adjustable cutter heads mounted in said slot, a cutting punch reciprocably mounted in each head, a pivoted actuating member supported below said table and provided with a straight slot parallel to the line of adjustment of said cutter heads, and an operating lever pivotally mounted on each head in engagement at one end with the cutting punch and at its opposite end with the slot in the actuator.

8. A thumb hole cutting machine comprising a table having a longitudinal slot therein, a pair of cutting heads extending through said slot and adjustable therein, a cutting punch reciprocably mounted in each cutter head, a rocking actuating member comprising a hub supported on pivots carried by the frame, a plate projecting from said hub and a straight slot or channel in the edge of said plate parallel to the line of adjustment of said cutter heads, and a punch operating lever pivotally mounted on each head engaging at one end with said punch and at its opposite end with the slot or channel in the actuator.

9. An actuator for imparting reciprocating motion to a plurality of longitudinal cutters comprising a body adapted to be supported on pivots, said body having a straight slot or channel formed therein to engage cutter operating means whereby said cutters are positively moved in both directions and may be adjusted to different positions without disengaging the connection between the actuator and the operating means.

10. A thumb hole cutting machine comprising a fixed table, a plurality of cutter heads adjustable mounted thereon, a cutting punch in each head, an independent support for the object to be cut, and independent means for adjusting each support.

11. A thumb hole cutting machine comprising a plurality of adjustable cutter heads, a cutting punch in each head, a yoke slidably mounted on each head, shelves carried by said yokes to support the object to be cut, and an adjusting screw connected to each yoke to raise and lower the same for regulating the depth of cut.

12. A thumb hole cutting machine comprising a plurality of adjustable cutter
heads, a cutting punch in each head, a punch operator supported on each cutter head, a common pivotally supported actuator for all the punch operators, and a movable connection between the actuator and each punch operator in continuous engagement therewith to permit adjustment of the cutter heads without disconnecting any of the parts and to positively advance and retract the punches.

13. A thumb-hole cutting machine comprising a plurality of adjustable cutter heads, a cutting punch in each head, a punch operator supported on each head, a pivotally supported actuator common to all the punch operators, a cam for imparting motion to the actuator, and other means connected to the actuator for operating the same, either of which may be operated without disconnecting the other.

14. A thumb hole cutting machine comprising a plurality of adjustable cutter heads, a cutting punch in each head, a punch operator supported on each cutter head, a common actuator for all the punch operators, an exterior cam for imparting motion to the actuator, optional driving means for said cam comprising a direct coupled motor and clutch coupled driven wheel, and foot operating means connected directly to said actuator.

15. A thumb hole cutting machine comprising a plurality of adjustable cutter heads, a cutting punch in each head, a punch operator supported on each cutter head, a common actuator for all the punch operators, a cam for imparting motion to the actuator, a worm gear wheel fixed on the shaft of said cam, a worm in engagement with said worm gear, means for driving the worm and a foot operating means connected to the actuator, said cam and foot operating means being optionally operative and either of which may be operated without disconnecting the other.

16. A thumb hole cutting machine comprising a plurality of adjustable cutter heads, a cutting punch in each head, a punch operator supported on each cutter head, a common actuator for all the punch operators, an exterior cam for imparting motion to the actuator, a worm gear wheel fixed on the shaft of said cam, a worm in engagement with said worm gear, a motor directly coupled to the worm shaft, a driven wheel clutch coupled to said shaft, and a foot operating means connected to the actuator for moving the same independently of the cam.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES D. REIFSNYDER.

Witnesses:
ALBERT D. MILLER,
CHARLES H. NITSCH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."