April 18, 1967 G. BUSCH ETAL 3,314,323

LABEL CUTTING MACHINE WITH A STATIONARY CUTTING KNIFE

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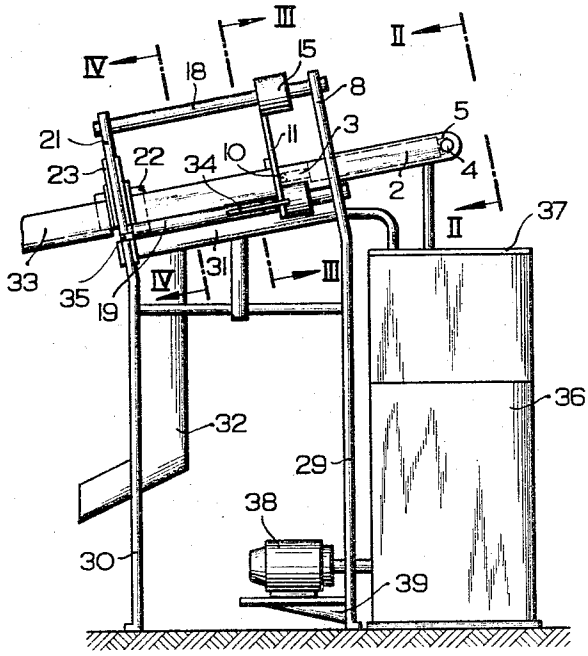
FIG.1



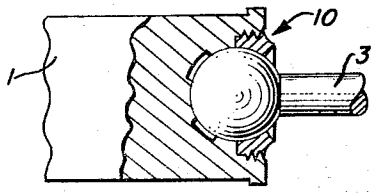


FIG.1a

FIG.2

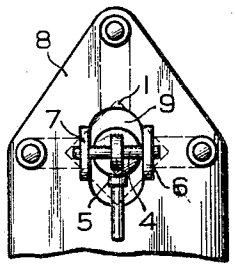


FIG.3

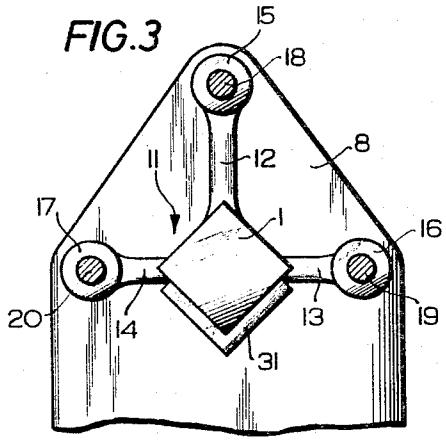
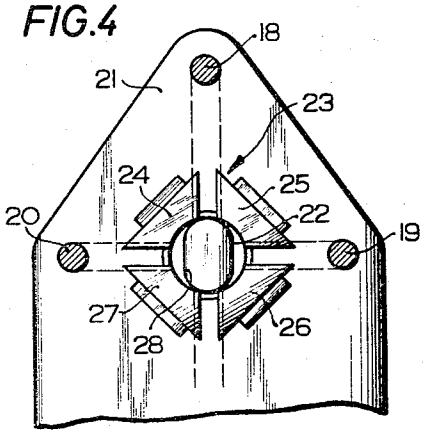


FIG.4



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LABEL CUTTING MACHINE WITH A STATIONARY CUTTING KNIFE

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FIG.5

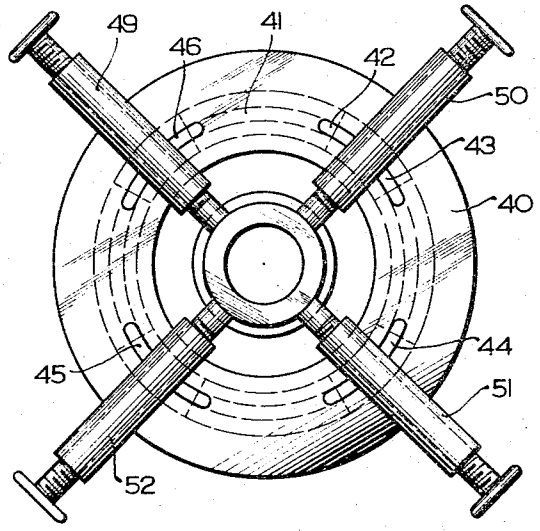


FIG.7

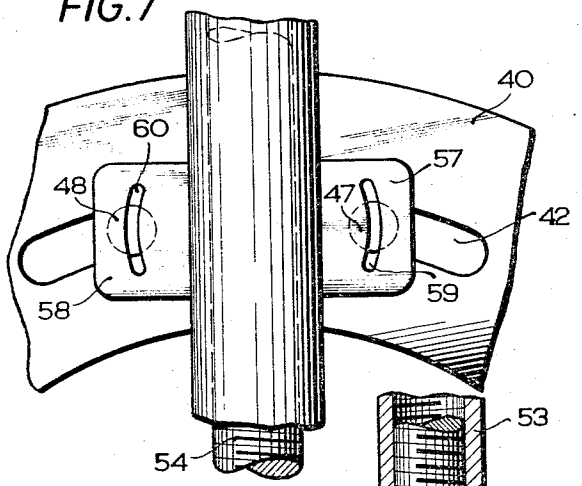


FIG.8

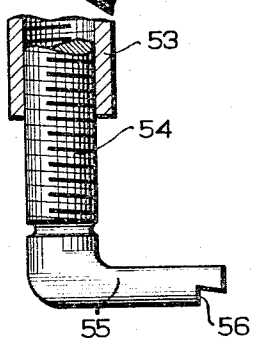
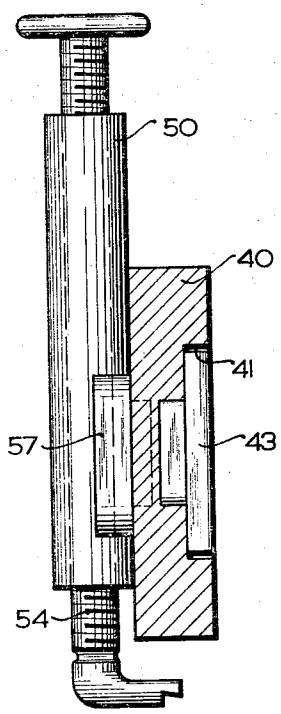


FIG.6



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LABEL CUTTING MACHINE WITH A STATIONARY CUTTING KNIFE

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FIG.9

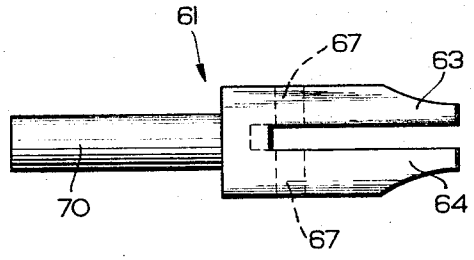
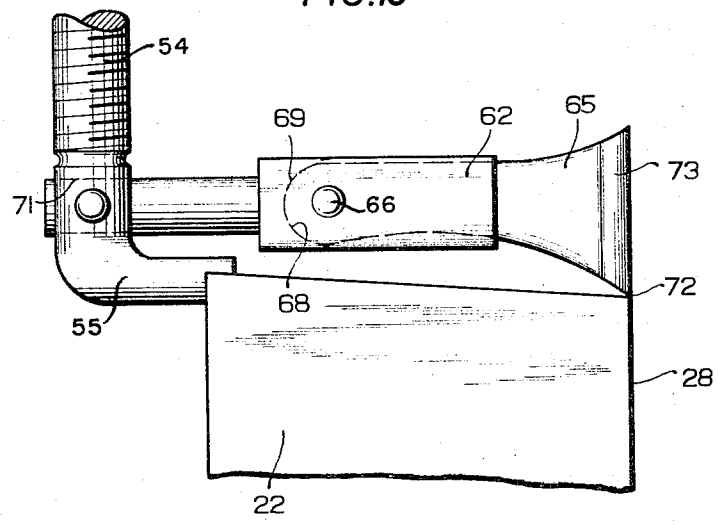


FIG.10



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3,314,323

LABEL CUTTING MACHINE WITH A STATIONARY CUTTING KNIFE

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Claims priority, application Germany, June 10, 1963, B 53,527
7 Claims. (Cl. 83—569)

This invention relates to a label cutting machine with a stationary cutting die in which the raw material for the labels is pressed against the stamping knife by a ram.

In the known label cutting machines of the mentioned type an extremely rapid wear of the guides has been observed which was caused by the unyielding guidance of the ram, and was particularly caused by the canting action due to the asymmetrical pressure distribution occurring when working labels of differing configurations were cut. This wear action is even increased when, in addition, the shapes of the labels are disposed in eccentric relation to the ram. Additionally, in these known label cutting machines, the insertion of the cutting die into a plate provided with a recess corresponding to the shape of the cutting die used in each case has been found to be disadvantageous, because this means that for each cutting die also a separate mounting plate is required which will increase the cost considerably due to the multiplicity of the different label shapes.

In addition to this, in the known label cutting machines, the cutting dies are, particularly for manufacturing labels with contoured peripheral shapes, provided with a separating knife welded to the outer periphery of the cutting die, or even made integral with it, and serving to sever that portion of the raw material extending beyond the cutting edge of the cutting die in order to allow that the scrap material may be carried away without difficulties. However, this construction of the cutting die is afflicted with the drawback of increased manufacturing cost and particularly the cutting die cannot be used without the separating knife which on the other hand is undesirable for certain label configurations. Besides this the mounting plate for the cutting die must be provided with a special recess for the separating knife.

The object of the invention is to provide a label cutting machine in which the above mentioned drawbacks are avoided.

This problem has been solved according to the invention in that the ram movable towards the cutting die is slidingly supported on guide rods, preferably in roller sleeves, and is connected through a universal joint with the piston rod of a double acting piston sliding within a cylinder having its end opposite of the piston rod outlet mounted to pivot about a pin.

In this, the speed of the movement of the ram and thus the cutting speed is adjustable in dependence on the fluid pressure adjustable by a pressure regulator and acting upon said ram.

An adjustable abutment is mounted on the ram serving to limit its stroke and to initiate its reverse movement, said abutment actuating a micro switch controlling the reverse movement. The arrangement of this abutment is particularly important, since thereby the spacing of the ram in front of the cutting die is adjustable at the end of the forward stroke, whereby damaging of the die by the ram is avoided.

In order to apply the cutting pressure exerted by the ram as far as possible centrally to the same, the cutting die is mounted in an adjustable block. This block may also consist of a plurality of separate segments each of which being adjustable independently, whereby a lateral

adjustment and also an adjustment in the height of the cutting die is possible.

Another even more advantageous mounting of the cutting die is obtained in that the mounting means is formed by a disc provided with an annular guide groove into which sliding pieces are inserted each of which being connected by screws to an adjustable spindle sleeve.

Due to this construction a plurality of spindle sleeves for holding the cutting die may be provided, whereby a corresponding number of holding points are obtained. In this it has been found to be of particular advantage if each spindle sleeve is provided with laterally arranged ears having arcuate slots formed therein for pivoting the spindle sleeve. In this manner the holding points of the spindle sleeves will engage the die in any desired manner, whereby a very exact adjustment is easily obtainable.

At their holding ends, i.e. at the ends of the spindles the spindle sleeves are formed with a hook-like member provided with a step for receiving the die.

For adjusting the spindle sleeves the guide groove is provided with holes or slots through which the clamping screws of the guide pieces extend.

In order to also provide in a label cutting machine of the above described type an independent arrangement of the separating knife, required for cutting the scrap material, the holding means for this separating knife is formed by a bolt provided with a bifurcated end into which the separating knife is inserted, while the other end of the bolt is guided in and secured to the holding means of the stamping knife, wherein the holding means for the cuting die is formed preferably by adjustable and pivotal spindle sleeves.

Since, in addition, the end of the holding means for the separating knife inserted into the holding means of the cutting die is adjustable and lockable both in upward as well as in longitudinal direction within the holding means for the die, the separating knife may be adjusted to any circumferential shape of the die.

In order to increase this possibility of adjustment, the bottom of the bifurcated end of the holding means is formed arcuately corresponding to the rounding of that end of the separating knife disposed oppositely to its cutting edge. In this manner, due to the upwardly pivotal arrangement of the separating knife in the holding means, it is possible to adjust the separating knife in such a manner that a point of the cutting edge of the separating knife is aligned with the cutting edge of the cutting die, whereby a simultaneous cut by the separating knife and the cutting die is obtained.

Further features and advantages of the invention will become evident from the following description of several embodiments in connection with the attached drawings, wherein:

FIG. 1 is a side view of a label cutting machine;

FIG. 1*a* is a partially sectioned side view of a universal joint as used in the machine of FIG. 1;

FIG. 2 is a view looking in the direction indicated by line II—II in FIG. 1;

FIG. 3 is a view looking in the direction indicated by line III—III in FIG. 1;

FIG. 4 is a view looking in the direction indicated by the line IV—IV in FIG. 1;

FIG. 5 is a view of the discharge end of the label cutting machine, comprising a different embodiment of the mounting means for the cutting die;

FIG. 6 shows a manner of mounting a spindle sleeve for holding the mounting means shown in FIG. 5;

FIG. 7 is a top view of a spindle sleeve with laterally attached ears;

FIG. 8 is a side view of a part of the spindle sleeve;

FIG. 9 is a top view of the holding means for a separating knife; and

FIG. 10 is a side view of the holding means with the separating knife inserted therein.

In the embodiment example of a label cutting machine shown in FIGS. 1–4 the ram 1 is actuated hydraulically. In a cylinder 2 a piston (not illustrated) is slidingly arranged, the piston rod 3 of which being connected at its outwardly extending end through a universal joint 10, which may be in the form of a ball and socket joint as shown in FIG. 1*a*, to the ram 1. The cylinder 2 is pivotally supported by a pin 4 at the end disposed remote of the ram. For this purpose the cylinder 2 is provided with an extension 5 through which the pin 4 extends. At the ends the pin 4 is secured in laterally spaced rails 6 and 7 which are attached to a plate 8. A slot 9 is provided in this plate 8 allowing to freely pivot the cylinder 2 about the pin 4.

Due to the pivotal connection by the pin 4 and due to the articulated connection of the piston rod 3 with the ram 1 the cylinder 2 with the piston rod 3 may, upon actuating the piston, adapt itself corresponding to the pressure acting on the ram 1.

The ram 1 is connected to a triple armed spider 11. The arms 12, 13, and 14 are provided with sleeve-like projections 15, 16, and 17 at their free ends into which ball bearing sleeves are inserted sliding on guide rods 18, 19, and 20. By means of this antifriction guidance and the ability that the operating cylinder 2 with its piston rod 3 can adapt itself to the pressures exerted on the ram a long life of the actuating device is assured.

The guide rods 18, 19, and 20 are secured to the plate 8 and extend to a second plate 21, whereto they are also secured. The plate 21 is adapted to receive the interchangeable cutting die 22, which is inserted into a block 23 adapted to be adjusted in height as well as laterally. In the embodiment shown as example this block is formed of four separate segments 24, 25, 26, and 27 sliding in guides and being adjustable in their positions by adjusting screws. Due to the segment-like subdivision of the block 23 different dies 22 of differing diameter may be mounted. The dies 22 are, at their ends facing the ram 1, provided with a cutting edge 28 the peripheral contour of which corresponding to the peripheral shape of the label to be stamped out. The other end of the die 22 is formed cylindrically, so that the individual segments 24–27 of the block 23 may rigidly encompass the inserted die.

The planes 8 and 21 are slantingly arranged in relation to the side walls 29 and 30 of the cutting machine in such a manner that a supporting rail 31 for the label material to be stamped out extending below the ram 1 towards the cutting die 22 is inclined from the ram 1 towards the die 22. Below the die 22 the supporting rail 31 is interrupted in order to allow the scrap material to be discharged into a chute 32. An interchangeable chute 33 for the stamped out finished labels is attached to the plate 21 in the rear of the die.

A rod 34 is adjustably arranged on the projection 16 of the spider 11 cooperating with a micro switch 35 secured to the plate 21 and serving for the reverse movement control. The hydraulic and control arrangement is accommodated within a housing 36 on the cover 37 of which the required push buttons are arranged. A pump arranged within the housing 36 is driven by a motor 38 mounted on a bracket 39 secured to the side wall 29.

In the holding means for the cutting die illustrated in FIGS. 5–8 a disc 40 is secured by screws to the discharge end of the label cutting machine. This disc 40 has an annular guide groove 41 formed therein provided with slots 42 in this embodiment example. Slide pieces 43–46 are placed into the annular guide groove 41 each being connected by screws 47, 48 always to one of the spindle sleeves 49–52.

These spindle sleeves 49–52 comprise each a sleeve provided with internal thread into which a spindle 54 is

screwed which has a hook-like bent holding member 55 arranged at its end so as to be able to rotate about the axis of the spindle 54 and being provided with a stepped portion 56. This stepped portion 56 is formed in such a manner that it is adapted to engage the periphery of the cutting die.

Ears 57 and 58 are attached to the sleeves 53 of each spindle sleeve. The ears 57 and 58 have oppositely curved slots 59 and 60 formed therein allowing a pivotal movement of the spindle sleeve relative to the radius of the mounting disc 40. Each spindle sleeve 49–52 is connected by the screws 47, 48 extending through these curved slots 59, 60 to the associated slide piece 43–46, whereby each spindle sleeve is maintained in the adjusted desired position.

When viewing FIG. 5 it will be noted that a sufficient number of spindle sleeves may be placed into the annular guide groove 41. It is also possible to replace the slots 42 in the mounting disc 40 by holes, however, the arrangement of slots offers a better possibility to adjust the spindle sleeves.

Furthermore any other manner to adjust the spindle sleeves in the mounting disc 40 is possible. It is merely important that the spindle sleeves may be arranged in different angular positions relative to each other.

The holding means for the separating knife 65 comprises a bolt 61 having a bifurcated end 62. The separating knife is inserted between the legs 63 and 64 of the bifurcated end 62 and maintained by a bolt 66 extending through the holes 67 in the legs 63 and 64 of the bifurcated end.

The bottom of the intermediate space between the legs 63 and 64 is arcuately formed and corresponds to the rounding 69 of the separating knife 65, so that upon pivoting the separating knife 65 about the axis of the bolt 66 always a rigid abutment of the knife at the bottom of 68 of the intermediate space is assured.

The end 70 of the bolt 61 disposed opposite to the bifurcated end 62 is inserted into the holding means for the cutting die 22 and may be round or polygonal. The spindle sleeve 50 for the die 22 is provided with a guide hole 71 for the end 70 of the bolt 61, so that the bolt may be shifted in longitudinal direction within this hole 71 and may be locked by a set screw, or the like. A plurality of guide holes 71 may be provided in the spindle sleeve 50, whereby also a height adjustment of the separating knife 65, or the bolt 61 respectively, is possible.

When adjusting the separating knife 65 it is very important that the point 72 of the cutting edge 73 of the knife 65 is exactly aligned with the cutting edge 28 of the die 22 so that the cut at this point is carried through simultaneously by both cutting edges.

From the foregoing description it will be evident that possible nonuniformities in the drive of the piston are avoided, that further the advance of the ram may be adjusted to move slower than the return movement and that the cutting speed may be adjusted corresponding to the worked material.

Another great advantage of the invention must be seen in the fact that cutting die and separating knife are independently adjustable and are manufactured and treated individually, whereby great savings in cost, and a considerably increased possibility for using them are obtained.

What we claim is:

1. A machine for cutting labels or the like comprising, in combination, support means; a stationary cutting die having an end face provided with a cutting edge; a ram having a working face facing said end face of said die and being movable along a rectilinear path toward and away from said die so that sheet material fed between said faces may be cut along said cutting edge when the sheet material is pressed by said ram against said cutting edge of said die; adjustable mounting means mounting said stationary cutting die on said support means, said adjustable mounting means including a plurality of elongated hold-

ing members arranged spaced from each other substantially in a plane parallel to said faces and each engaging with one end thereof said stationary cutting die at the end thereof opposite from said end face, and means mounting each of said holding members on said support means adjustable in longitudinal direction toward and away from said stationary cuting die and adjustable in transverse direction toward and away from each other and each tiltable about an axis normal to said plane; rectilinear guide means extending substantially normal to said faces and engaging said ram for guiding the latter during its movement; drive means for moving said ram back and forth along said rectilinear path and including cylinder means having one closed end and piston means projecting with one end beyond the other end of said cylinder means, said cylinder and piston means extending substantially in direction of movement of said ram and one of said last mentioned two means being pivotally mounted at said one end thereof on said support means; and connecting means connecting said one end of the other of said two means for limited universal movement to the end of the ram opposite to said working face thereof.

2. A machine for cutting labels or the like as set forth in claim 1, wherein said connecting means are in the form of a universal joint.

3. A machine for cutting labels or the like as set forth in claim 1, wherein said guide means include at least a pair of parallel guide rods fixed at opposite ends thereof to said support means, and a pair of anti-friction bearing means fixed to said ram and rollingly engaging said guide rods.

4. A machine for cutting labels or the like as set forth in claim 1, wherein each of said elongated holding members is formed with an outer screw thread, and wherein said mounting means include an annular plate fixed to said support means substantially parallel to said faces and surrounding said stationary die, said annular plate being formed with a coaxial annular guide groove, an internally threaded sleeve for each of said elongated holding members in which the respective holding member is threadingly engaged, a slide member for each sleeve slidably guided in said groove and means connecting each sleeve to the respective slide member adjustably tiltable about an axis substantially normal to said plate.

5. A machine for cutting labels or the like comprising, in combination, support means; a stationary cutting die having an end face provided with a cutting edge; adjustable mounting means mounting said stationary cutting die on said support means; a separating knife having a cutting edge extending outwardly and transversely to said cutting edge of said stationary cutting die; means mounting said knife on said adjustable mounting means of said cutting die in such a manner that one end of said cutting edge of said knife is located at the cutting edge of said die; a ram having a working face facing said end face of said die and being movable along a rectilinear path toward and away from said die so that sheet material fed between said faces may be cut along said cutting edge when the sheet material is pressed by said ram against said cutting edge of said die; rectilinear guide means extending substantially normal to said faces and engaging said ram for guiding the latter during its movement; drive means for moving said ram back and forth along said rectilinear path and including cylinder means having one closed end and piston means projecting with one end beyond the other end of said cylinder means, said cylinder and piston means extending substantially in direction of movement of said ram and one of said last mentioned two means being pivotally mounted at said one end thereof on said support means; and connecting means connecting said one end of the other of said two means for limited universal movement to the end of the ram opposite to said working face thereof.

6. A machine for cutting labels or the like as set forth in claim 5, wherein said means for mounting said knife include a bolt having a bifurcated end, said knife extending with a portion thereof opposite the cutting edge thereof into said bifurcated end of said bolt and being pivotally mounted therein, and means for adjustably mounting said bolt on said adjustably mounting means of said stationary die.

7. A machine for cutting labels or the like as set forth in claim 6, wherein said knife has opposite the cutting edge thereof a convexly curved end face abutting against a correspondingly concavely curved bottom face of the bifurcated end of said bolt.

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