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Hartmann

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[54] **HAND-OPERATED SLICING CUTTER MECHANISM**

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[30] **Foreign Application Priority Data**

Mar. 1, 1971 Germany ..... G 71 07 546.2

[52] **U.S. Cl.** **30/283**

[51] **Int. Cl.** **B26b 3/03**

[58] **Field of Search** 30/283, 284, 304

[56] **References Cited**

UNITED STATES PATENTS

2,475,824	7/1949	Devine	30/283 X
2,856,688	10/1958	Kopel	30/283
3,095,646	7/1963	Szekely	30/283

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Assistant Examiner—J. C. Peters
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[57] **ABSTRACT**

A hand-operated slicing cutter mechanism wherein a flexible cutting blade is clampingly mounted at its ends in spanned condition at support means which, in turn, are displaceably mounted at an impact element possessing an impact surface intended to bear against the material to be cut, for the purpose of changing the spacing between the cutting blade and the impact surface. According to important aspects of the invention, the support means consists of the legs of a rigid substantially U-shaped support element at which there is guided the impact element in a direction which is disposed perpendicular to the plane of the cutting blade and the impact surface. At one of both elements there is rotatably mounted an adjustment shaft parallel to the cutting blade which is equipped at the region of the legs with similar pinion teeth which mesh with the teeth of a gear rack present at the other of both elements.

4 Claims, 4 Drawing Figures

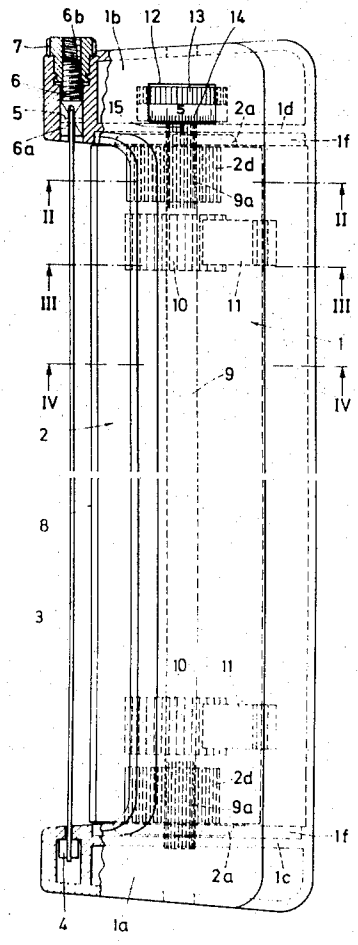


FIG. 1

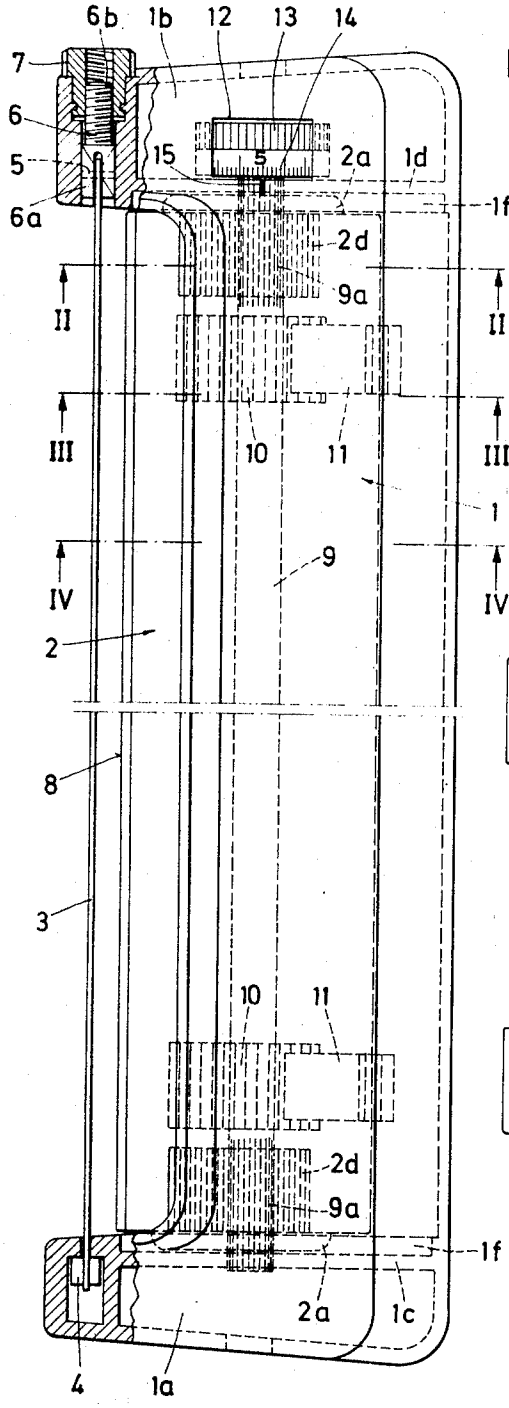


FIG. 2

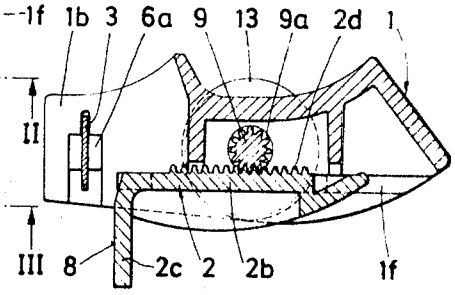


FIG. 3

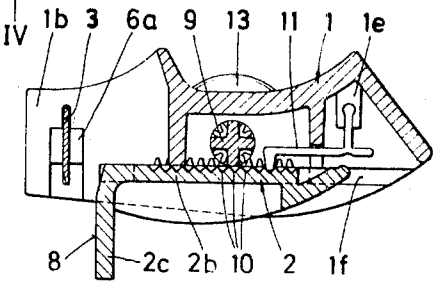
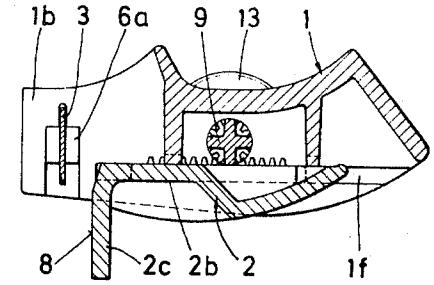


FIG. 4



HAND-OPERATED SLICING CUTTER MECHANISM

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved hand-operated slicing cutter mechanism or slicing cutter wherein a flexible cutting blade is spanned at its ends at support means which, in turn, are displaceably mounted at an impact element possessing an impact surface intended to bear against the material to be cut for the purpose of changing the spacing between the cutting blade and the impact surface.

U.S. Pat. No. 2,856,688, teaches a slicing cutting mechanism of this general character wherein the support means consists of pins, one of the pins being mounted in a borehole of the impact element, the other in an elongate hole of a bolt-like projection or extension of the impact element, which also serves as the handgrip. A mechanism which operatively engages with the projection of the impact element allows for a transverse displacement of such pin in the elongate hole for the purpose of increasing or reducing the blade stress. Only when the cutting blade is not spanned is it possible to carry out a change in the spacing between the cutting blade and the impact surface through displacement of both pins in their lengthwise direction. Additionally, it is difficult, cumbersome and time-consuming to undertake such displacement in such a manner that there is maintained the parallelism of the cutting blade with regard to the impact surface. Further, after having carried out the required spacing change, it is of course necessary to again span the cutting blade.

Another construction of slicing cutting mechanism which is designed as a hand-operated unit has been taught in U. S. Pat. No. 3,095,656, wherein a flexible cutting blade is not attached so as to be clamped or spanned, simply connected by means of screws to the front ends of two slides guided in grooves of an impact element. At the underside of the impact element, both slides are interconnected with one another by a connection rod consisting of sheet metal, and at the lengthwise center of which there operatively engages an adjustment mechanism mounted at the impact element. By means of this adjustment mechanism the connection rod together with the slides and the cutting blade can be adjusted for the purpose of changing the spacing between such cutting blade and the impact surface. This device is considered to be surely practically hardly usable, firstly because of the absence of any blade clamping or spanning mechanism, secondly because of the unsuitability of the spacing adjustment mechanism. This unsuitablility is deemed to be predicated upon the fact that in all probability, during the adjustment operation, the slides bind in their guide grooves, thereby also destroying the parallelism of the cutting blade with regard to the impact surface.

SUMMARY OF THE INVENTION

Accordingly, from what has been explained above, it will be recognized that the art is still in need of a hand-operated slicing cutting mechanism or slicing cutter which is not associated with the aforementioned drawbacks and limitations of the prior art constructions. Therefore, a primary objective of the present invention is to provide a new and improved construction of hand-operated slicing cutter mechanism which effectively

and reliably fulfills the existing need in the art and is not associated with the aforementiond drawbacks and limitations of the prior art constructions.

Still a further significant object of the present invention relates to a new and improved construction of hand-operated slicing cutter mechanism which does not exhibit the drawbacks of the above-discussed prior art constructions, can be fabricated at relatively low cost, can be easily and dexterously used by even unskilled individuals, and wherein adjustment of the spacing between the cutting blade and the impact surface can be quite easily carried out.

In particular, it is a further specific object of the present invention to provide a novel construction of cutter mechanism by means of which it is also possible, during such time as the cutting blade is in its spanned or clamped position, to be able to change the spacing of the cutting blade with regard to the impact surface, while positively maintaining parallelism of cutting blade and impact surface.

The last-mentioned objective is particularly difficult to solve since there must be taken into account an irregular friction of the support means at its guides. Especially if, among other things, the impact element for reasons of cost and for the purpose of reducing weight, should be fabricated as an injection molded part or component, then one must take into account less deformation during changing of the clamping action at the cutting blade. Thus it is not possible to rely upon an exact guiding without play of the support means.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the inventive cutting mechanism is manifested by the features that the support means consists of the legs of a rigid substantially U-shaped support element at which there is guided the impact element in a direction perpendicular to the plane of the cutting knife and the cutting surface. Further, there is rotatably mounted at one of both elements an adjustment shaft which is parallel to the cutting knife and which is provided at the region of the legs with similar pinion teeth which mesh with gear rack teeth provided at the other of both elements.

It should be apparent that such construction is in no way dependent upon the exactness of the parallel guide of the support element at the impact element. Hence, it is completely acceptable to fabricate both elements as mass-produced, very inexpensive injection molded plastic parts, and specifically together with the gear rack teeth, at one such part or component. This is extremely advantageous as concerns the total manufacturing costs.

Now in accordance with a preferred physical manifestation of the present invention, one of both support element legs, in which the adjustment shaft is mounted, is provided with an opening at the region of such adjustment shaft through which extends a handwheel which is fixedly seated upon the adjustment shaft.

This construction affords increased handiness or manipulation possibility of the slicing cutter and renders possible a pleasing constructional form, something which is extremely significant from the commercial standpoint.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be better understood and objects other than those set forth above, will become apparent

when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawing wherein:

FIG. 1 is a top plan view of the slicing cutting mechanism designed according to the invention;

FIG. 2 is a cross-sectional view of the cutting mechanism or slicing cutter depicted in FIG. 1, taken substantially along the line II—II thereof;

FIG. 3 is a cross-sectional view of the cutting mechanism depicted in FIG. 1, taken substantially along the line III—III thereof; and

FIG. 4 is a cross-sectional view of the cutting mechanism depicted in FIG. 1, taken substantially along the line IV—IV thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to the drawings, the slicing cutting mechanism constructed as a hand-operated cutter instrument and depicted in the drawing, will be seen to embody a rigid support or carrier element 1 which in plan view possesses a substantially U-shaped configuration and an impact or contact element 2. Each of these elements 1 and 2 are advantageously fabricated as injection molded plastic parts. A flexible cutting blade or knife 3 can be clamped or spanned at the legs 1*a* and 1*b* of the support element 1. At the leg 1*a* the cutting blade 3 is introduced from below into a slot of the leg wall at which bears a bolt member 4 which is fixedly riveted or otherwise suitably secured to such blade end. The other blade end is attached by means of a pin 5 at a square portion 6*a* of a clamping or tensioning bolt 6 which is guided in a suitable hole or aperture of the leg 1*b* and the screw-formed part 6*b* of which carries a tightening or clamping nut 7, the thickened freely exposed portion of which is knurled at its periphery.

The lengthwise extending portion of the substantially U-shaped support element 1, which portion is relatively long in comparison to the legs 1*a* and 1*b*, is provided with ribs at its underface for the purpose of increasing its rigidity or bending strength. Its upper wall forms a gripping trough for receiving the thumb and the ball of the thumb of that hand held at the cutter. At the inner transverse walls 1*c* and 1*d* of the leg members 1*a* and 1*b* respectively, there is formed is formed a respective groove 1*f* which is disposed at right angles to the plane of the cutting blade 3. Tongue members 2*a* are displaceably guided in such grooves 1f. These tongue members are provided at the ends of that part or portion 2b of the impact element 2 diposed at right angles to the plane of the cutting blade 3, and while part 2*b* for the most part is flat or planar. The part 2*b* is, however, profiled at approximately the central third of its length in such a manner that it forms a gripping trough or groove for the other fingers of the hand holding the cutter as best seen by referring to FIG. 4. The part 2*c* extending over the entire length of the impact element 2 possesses the impact or contact surface 8 extending parallel to the cutting blade 3 and intended to bear against the material to be cut.

Now at holes or openings of the transverse walls 1*c* and 1*d* of the support element 1, there is rotatably mounted an adjustment shaft 9 which extends substantially parallel to the cutting blade 3. The end portions 9*a* of this adjustment shaft 9 are formed as identical or similar pinions which mesh with identical or similar gear rack teeth 2*d*, the rack teeth of which protrude out of the upper surface of the impact element portion 2*b*, as such has been best shown by referring to FIG. 2. It should be observed that neither the pinion teeth of the shaft end portions 9*a* nor the gear rack teeth 2*d* possess an offset or displaced portion. Additionally, it is to be observed that the pinion teeth cooperate without play with the gear rack teeth. The mechanism embodying the adjustment shaft 9 and the teeth 2*d* should insure that in each adjusted position the impact surface 8 is perfectly parallel with regard to the cutting blade 3, because otherwise binding can occur during the cutting operation which, as experience has shown, can be very much of a hindrance. The parallel guiding rendered possible by the just-considered mechanism also enables the provision of a sufficient amount of play between the end surfaces of the tongues 2*a* and the oppositely situated floor surfaces of the guide grooves 1*f* and likewise between the end surfaces of the impact element and the oppositely situated transverse walls 1*c* and 1*d* of the support element 1, which play can possibly change during change of clamping or spanning action exerted at the cutting knife or blade.

The part 2*b* of the impact or contact element 2 is provided at its upper face with two rows of pawl or locking recesses 10 adjacent the teeth 2*d*, and with which recesses 10 cooperate resilient locking or rachet elements 11 for arresting the displacement of the support element 1 with regard to the impact element 2. These locking or rachet elements 11, formed for instance of plastic, may advantageously possess the nose-like configuration depicted in FIG. 3 and are fixedly retained by means of one of their legs at the bifurcated eyes or eyelets 1e formed at the support element 1.

The support element leg 1*b* is provided at its upper wall with an opening 12 out of which protrudes an adjustment handwheel 13 pressed onto or otherwise suitably connected with the there located end portion 9a of the adjustment shaft 9. Since the justmentioned handwheel 13 possesses very little lateral play in the opening 12, the axial mobility of the adjustment shaft 9 is correspondingly limited. The handwheel 13 is provided with knurls or serrations at one-half of its width, the remaining outer surface carries a scale 14 which in coaction with an index line 15 provided at the support element 1 indicates the magnitude of the spacing between the cutting blade 3 and the confronting impact surface 8.

While there is shown and described a present preferred embodiment of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims. Acoordingly,

What is claimed is:

1. A hand-operated slicing cutting mechanism comprising support means, a flexible cutting blade clamped at its ends at said support means, an impact element possessing an impact surface intended to bear against the material to be cut, said support means being displaceably mounted at said impact element for the purpose of changing the spacing between the cutting blade and said impact surface, said support means comprising a rigid substantially U-shaped support element having leg members, said impact element being guided at said U-shaped support element in a direction perpendicular to the plane of said cutting blade and the impact surface, an adjustment shaft rotatably mounted at one of

said elements and disposed substantially parallel to the cutting blade, said adjustment shaft being provided with similar pinion teeth at the region of said leg members, the other of said elements having gear rack teeth, said pinion teeth engaging with said gear rack teeth.

2. The slicing cutting mechanism as defined in claim **1,** wherein one of both support element-leg members at which there is mounted said adjustment shaft is provided with an opening at the region of such adjustment shaft, a handwheel fixedly seated upon said adjustment shaft and protruding out of said opening.

3. The slicing cutting mechanism as defined in claim **2,** wherein said handwheel carries scale means for indicating the spacing between said cutting blade and the impact surface.

4. The slicing cutting mechanism as defined in claim **1,** further including resilient locking means for arresting displacement of the support element and impact element with respect to one another.

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