SLICING MACHINE FOR EXPANDED PLASTICS AND SIMILAR MATERIALS

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Filed: Dec. 22, 1971
Appl. No.: 210,822

U.S. Cl. 83/4, 83/730, 83/813
Int. Cl. B26d 3/28
Field of Search 83/4, 718, 731, 730, 83/813, 558, 574

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ABSTRACT
A machine for slicing blocks of material into uniform layers, or sheets, utilizes two oppositely reciprocating parallel tables to supply two blocks of material, and a slicing blade mounted so that it can be alternately applied to each of the two blocks when moving in one of the two reciprocating directions, whereby a layer will be sliced from one or the other of the blocks during each traverse of the two tables.

11 Claims, 3 Drawing Figures
SLICING MACHINE FOR EXPANDED PLASTICS AND SIMILAR MATERIALS

The invention relates to a slicing machine for the slicing of blocks of material made of a soft raw material, especially blocks of expanded plastic, into thin individual layers, with a cutting assembly adjustable in height and a table bearing the blocks of material which is slidable in the direction of cutting as well as in the opposite direction thereto.

Various types of such machines are known. In the case of the most simple machines of this type the conveying table with the blocks of material on it is pushed against an endless revolving band knife of the cutting assembly guided by a so-called cutter bar or between stretched steel bands, prior to the return of the table and in the case of use of a cutter bar, each time the layer just sliced off must be removed. In the case of known machines of this type it moreover is disadvantageous that the time during which the conveying table returns to its starting position is lost. This disadvantage is also inherent in those of the known machines whose knife guidance is that the return of the knife takes place in the sectional plane between the block of material and the layer just sliced off, so that the separate removal of the individual layers is omitted. Therefore, the disadvantage of unused time during the return trip of the conveying table remains and, because of the special characteristics of expanded plastics, especially their poor sliding characteristics in contact with the knife guides, the return speed must be considerably lower than the cutting speed if a perfect sliding return of the knife guide between the block of material and the sliced off layers is to be achieved. This results in more than half the total time being considered idle time unused for the removal and slicing process. Moreover, in the case of such a machine, an operator must at all times be present for supervision, because the danger of jamming and the possibility of the previously sliced layer getting hung up between the knife guide and the block of material is not to be excluded. The static electrical charges which unavoidably occur in the case of such machines especially contributes to an increase of this danger.

Therefore the attempt has been made to construct machines of the initially mentioned type which slice off a layer each time both in the forward slide and in the return slide of the table. These machines (see for example Federal German Republic Utility Patent 1,760,000) have two band knives in one common knife guide with approximately a wedge shaped cross-section. Practice, however, shows that even layers cannot be sliced off with such cutting assemblies effectively in both directions. This is due to the fact that during slicing of each layer certain irregularities cannot be avoided. Practice, however, shows that these irregularities are repeated consistently if one operates always in the same cutting direction, so that uniformly thick layers will result. If cutting is accomplished however alternatingly first in one direction and then in the other direction, in practice it is not possible to slice off uniform layers. Thus, for example, the danger exists that wedge shaped layers will develop.

The object of the present invention is the construction of a machine that has the advantages of the simple machines with a slidable table, where cutting is accomplished only in one direction, namely, the production of absolutely uniform layers, which, on the other hand, however, will avoid any noteworthy idle times. Starting with a machine of the initially mentioned type, this object is achieved according to the invention through the fact that two oppositely moving slidable tables are provided beside one another and the cutting assembly is alternatively shiftable transversely with respect to the cutting direction. The machine according to the invention operates in such a way that while one table moves from one of its terminal positions against the blade of the band knife of the cutting assembly and is shifted to its other terminal position, the other table, which at the beginning of this process was in the other terminal position, is moved back to its opposite terminal position, so that it stands in front of the band knife of the cutting assembly. After slicing a layer off on the first mentioned table, the cutting assembly then is shifted across to the second table, for which purpose only a relatively short time is needed, whereas on the second table is pushed forward against the cutting edge of the band knife, while the first table is pushed back to its starting position. In this manner extremely uniform layers of even the thinnest thickness can be sliced off, which is particularly essential if one considers that with the machines in question blocks of expanded plastic can be sliced into layers and stacked, where the thickness of the layer lies in the order of magnitude of 1 mm and where, at the same time, the cutting tolerances lie in the order of magnitude of one-tenth mm or less. Furthermore, in the case of the machine according to the invention, the layers that have been sliced off may remain stacked one on top of the other, since the band knife with the knife guide always passes through the blocks of expanded plastics in the same direction and, finally, the relatively short idle time that is needed for the transverse shifting of the cutting assembly can be used for the lowering of the assembly to the next cutting level. It must be stressed, however, that the preparation for the thickness of cut must always take place only during shifting of the cutting assembly, so that the control of the machine according to the invention will be particularly simple. This also is true in view of the fact that in contrast to the known machines; where the shifttable always cuts in only one direction and where the band knife with its guidance is returned to the starting position outside the expanded plastic in order to avoid malfunctions, or where the band knife is lifted slightly after emerging from the block of expanded plastic in order to return it; the cutting assembly in the present invention does not have to be lifted prior to the return of the table. Furthermore, practice has shown that ordinarily no considerable additional time is needed for the lateral shifting of the cutting assembly from a position in front of one of the tables to the position in front of the other table, since this process usually can be accomplished in the same time needed for the lowering of the cutting assembly to its position for the next cut.

Other characteristics and details of the invention will become clear from the attached claims and/or the subsequent description which serves for the detailed explanation of an embodiment of the invention given by way of example and on the basis of the attached drawings, in which a preferred construction of a slicing machine according to the invention is shown.

FIG. 1 shows a front view of a slicing machine according to the invention;
FIG. 2 is a plan view, and FIG. 3 is a side view of said slicing machine. Essentially the machine consists of a cutting assembly movable transversely with reference to its cutting direction, a portal for the support and adjustable height positioning of the cutting assembly, as well as a double sliding table arrangement designated as a whole by numeral 3.

The cutting assembly 1 has a frame constructed of lateral parts 4 and a yoke on which the support wheels 6, 7, 8 and 9, for the band knife 10 are mounted, for example, band knife wheel 9 in this case is mounted on the stub of the shaft of a driving motor 11 which drives the band knife 10.

The band knife 10 revolving around the band knife wheels 6, 7, 8 and 9 is guided in the cutting area in a narrow knife guide 12, which may consist of steel bands stretched under high tension. In order to sharpen the band knife there is a sharpening apparatus (not shown) of a known construction.

The design of such cutting assemblies is sufficiently well known and therefore needs no more detailed explanation.

The cutting assembly 1 is rotatably connected with two brackets 14 by means of a pivoting bearing 13 (see FIG. 3).

The cutting assembly 1 can be adjusted in various angular positions with reference to brackets 14 by means of two spindles 16 mounted on both brackets in elements 15, on which spindles two spindle nuts 17 are seated that are attached movably to the cutting assembly. At the same time the two spindles 16 are adjustable together by means of a connecting shaft 18 and bevel gears 18a by way of a hand wheel 19. This adjusting arrangement serves for the variable adjustment of the cutting angle of the knife guide and band knife.

The brackets 14 are supported by means of guide rolls 20 on an upper guide tube 22 and by means of guide rolls 21 bearing against a lower guide tube 23 of a cross traverse 24, which, in addition, has a third metal tube 23a. The arrangement of guide rolls 20 and 21 offset from the center of gravity of cutting assembly 1 in this case brings about an advantageous and continuous contact pressure of cutting assembly 1 against cross traverse 24.

In order to achieve quiet and easy running, guide rolls 20 and 21 preferably are made of a wear resistant plastic.

The guide tubes 22, 23 and 23a of the cross traverse 24 are rigidly connected to guide heads 26 by means of flange plates 25, which are guided for vertical shifting in lateral stands 37 of the portals 2 in a manner to be described.

In order to accomplish the cross movement of the cutting assembly 1, a driving assembly 27 for transverse adjustment is mounted on the left-hand guide head 26 by means of a bracket 28. This assembly may consist, for the purpose of achieving a smooth starting and braking operation, as well as a precise transverse positioning of the terminal positions of the cutting assembly, of a reversible driving motor which can effect movement of the cutting assembly by means of an appropriate conventional electric control circuit.

The driving connection between the driving assembly 27 for the transverse adjustment and the cutting assembly 1 is accomplished in the present example by way of a chain 29 carried by sprockets 30 and 31 mounted on the cross traverse 24, the ends of the chain being attached to the two brackets 14 of cutting assembly 1.

The driving connection between assembly 27 for the transverse adjustment and sprocket wheel 30, is established by means of a shaft 33, a bevel gear drive 34 and the transmission 32.

In order to achieve a smooth vertical guidance, the guiding heads 26 of the cross traverse 24 are equipped with rolls 35 which are guided in rails 36 of the two pillars 37.

The guide heads 26 have spindle nuts 38 which are seated on shafts 39, supported in bearings 40 of pillars 37. The lower ends of shafts 39 projecting through bearings 40 are coupled via bevel gearing 41 with shafts 42, and are driven via an additional bevel gearing 43 by a driving motor 44 for the adjustment in height and set for micrometric adjustment in any conventional manner which does not need to be described in detail.

In connection with an electric control, which likewise is well known, the driving motor 44 causes a precise and automatic lowering of the cross traverse 24 and the cutting assembly 1, and the band knife 10 to each of the desired cutting widths.

The two-table arrangement 3 consists essentially of two sliding tables 45 and 46 which can be shifted in opposite directions by means of a common driving assembly of special design.

The two sliding tables 45 and 46 in this case are mounted shiftable on rails 45a and 46a one beside the other and in their extreme end positions the tables are always staggered with reference to one another.

The movement of sliding tables 45 and 46 is accomplished by driving assembly 47 which preferably consists of a controllable driving motor with a special electric control that makes possible smooth starting and stopping; a precise stopping of the tables in their terminal positions as well as a continuous regulation of the speed. Such driving and control arrangements are well known and do not need any detailed explanation.

The driving assembly 47 drives a bevel gearing 49 via an elastic coupling 48, the bevel gearing being coupled with two shafts 50 and 51 so that they will respectively rotate in opposite directions.

 Shafts 50 and 51 are connected with cable drums 52 and 53 mounted below the two sliding tables 45 and 46 in saddles 52a and 53a. Cables 54 and 55, wound respectively onto cable drums 52 and 53, are attached under tension at their two ends to the respective ends of sliding tables 45 and 46 and, of course, in such a way that the tables in their terminal positions are displaced with reference to each other. Attachment of the cable can be recognized clearly in FIG. 2; a portion of each cable wound onto the pertinent cable drum always lies between the ends of each cable.

By the term “table” in this case is meant basically any kind of shiftable carrying arrangement for the blocks of material that are to be sliced; thus, for example, instead of rigid table plates, reversible conveying belts could be used supported by plates in the cutting area.

If furthermore is possible to provide a cutting assembly which is shiftable only transversely instead of an assembly which can be adjusted in height and it would be possible to combine this first cutting arrangement with tables which could be adjusted in height.

What is claimed is:

1. Machine for slicing blocks of relatively soft material such as cellular plastic into uniform individual lay-
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ers comprising support means for a pair of blocks of material to be sliced, cutter assembly means including slicing knife means to sever said layers from said blocks during relative movement therebetween in one direction, and means to mount said support means and knife means for relative movement with respect to each other to reciprocatingly move said blocks in parallel paths in opposite directions and to alternatively position the knife means in operative slicing engagement with a respective one of the pair of blocks only when the relative movement between the knife means and the respective one of the blocks is in said one direction.

2. The invention defined in claim 1, wherein said support means for the pair of blocks includes a pair of tables mounted for movement in parallel side-by-side relationship, means to concurrently reciprocate said tables in opposite directions between two similar terminal positions in said parallel relationship, and means to mount said cutter assembly means for reciprocal movement in a direction transverse to the directions of movement of the tables in a path located medially of said terminal positions.

3. The invention defined in claim 2, wherein said pair of tables includes surfaces to support a pair of articles to be sliced in a common plane, and said means to mount the cutter assembly means includes means to adjustably position said slicing knife means in a plurality of planes spaced from said common plane.

4. The invention defined in claim 3, wherein said knife means comprises an endless band slicing blade, and said means to mount the cutter assembly means also includes means to adjustably position the operative portion of said blade in a plurality of planes angularly related to said common plane and containing a line extending transverse to said directions of movement of said tables.

5. The invention defined in claim 2, wherein said means to mount said cutter assembly means includes traversing supporting means for said slicing knife means disposed above said tables and extending transversely to said directions of movement between the respective outer side extremities of the tables.

6. The invention defined in claim 5, wherein said traversing supporting means includes at least one elongated horizontal guide means extending between said outer side extremities of the tables, and said cutter assembly means includes at least two longitudinally spaced roll means to suspend the assembly means from said guide means in rolling contact therewith, the path defined by said rolling contact being spaced horizontally to the side of the center of gravity of the assembly opposite to the side from which material approaches to be sliced, and third roll means spaced from the first two roll means and in rolling contact with the guide means to maintain said relative position of the center of gravity with respect to the first two roll means.

7. The invention defined in claim 5, wherein said traversing supporting means includes a pair of vertical pillars disposed on opposite sides of the pair of tables, elongated horizontal traverse means to slidably support the cutter assembly means, a pair of guide heads at the extremities of the traverse means, and means to vertically adjustably connect the guide heads with the respective pillars.

8. The invention defined in claim 7, wherein said means to vertically position the guide heads includes a pair of vertical shafts rotatably mounted on said pillars, and common drive means to rotate said shafts concurrently.

9. The invention defined in claim 7, wherein said pillars are provided with a plurality of vertical surfaces, and said guide heads include a plurality of rolls for rolling contact with said surfaces.

10. The invention defined in claim 1, wherein said means to mount said support means for a pair of blocks of material to be sliced includes a pair of tables mounted on parallel spaced rails, and common drive means connected with both said tables to concurrently move the tables along said rails in opposite reciprocal directions.

11. The invention defined in claim 10, wherein said common drive means includes a pair of shafts rotatably mounted below said tables, and means to rotate the shafts concurrently in opposite directions.

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