



(12) **EUROPEAN PATENT APPLICATION**

(21) Application number : **93500119.8**

(51) Int. Cl.⁵ : **B28D 1/22**

(22) Date of filing : **04.08.93**

(30) Priority : **07.08.92 ES 9201661**
15.12.92 ES 9202535
17.12.92 ES 9202547

(43) Date of publication of application :
13.04.94 Bulletin 94/15

(84) Designated Contracting States :
AT BE CH DE DK FR GB GR IE IT LI LU MC NL
PT SE

(71) Applicant : **GERMANS BOADA, S.A.**
Pol. Can Rosès., Av. Olimpiades, s/n
E-08191 Rubi (Barcelona) (ES)

(72) Inventor : **Rebollar Garcia, Rafael**
Poligon Can Rosés, Av. Olimpiades, s/n
E-08191 Rubi, Barcelona (ES)
 Inventor : **Duran Conesa, Salvador**
Poligon Can Rosés, Av. Olimpades, s/n
08191 Rubi Barcelona (ES)

(74) Representative : **Ponti Sales, Adelaida et al**
C. Consell de Cent, 322
E-08007 Barcelona (ES)

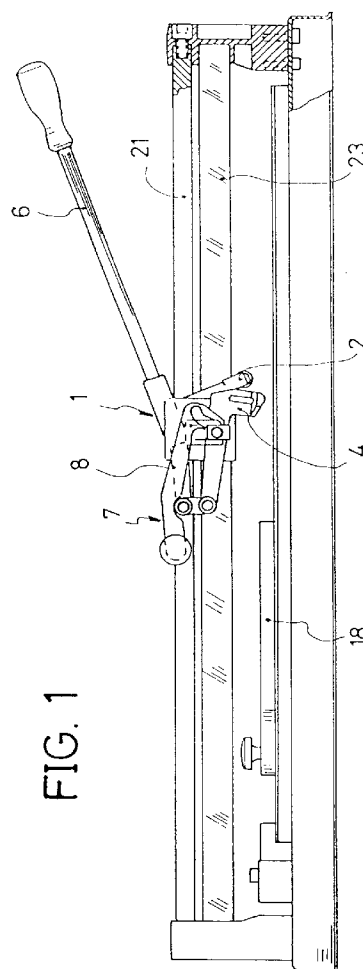
(54) **Machine for cutting/separating flat pieces of ceramic and the like.**

(57) It comprises a sliding support (1) bearing a tool (2) for marking the flat ceramic piece (3) with a groove (25), and a mechanism (4) for separating said piece (3) into two parts, said mechanism forming an integral part of the sliding support (1) and being actuated by the same lever (6) which is used to actuate said tool.

The cutting tool (2) is mounted on a shaft (30) comprising a projection (31) on the sliding support (1) and a recess (32) in said shaft (30), said projection (31) and said recess (32) being mutually coupled to position the shaft (30) relative to the sliding support (1).

It also comprises a fixed stop rule (108), an element (109) which can be moved linearly along a guide, a rotating element (110) connected to said element (109), and a fixed sector (111), graduated in angles, relative to which moves the rotating element (110), said element (110) comprising the guide (112) along which moves the element (109), the latter being graduated along its length.

The cutting and separating of the piece is made easier, the correct positioning of the cutting tool is ensured, and it is possible to make repeated, accurate cuts at any angle.



The present invention relates to a machine for cutting/ separating flat pieces of ceramic and the like, such as tiles, and other pieces used for flooring, glazed tiling and surfacings in general during construction.

The machine is of the type which comprises a sliding support which carries a tool for cutting or marking the flat ceramic piece, said cutting tool marking the piece with a groove, and further comprises a mechanism for separating said piece into two parts along said groove, said mechanism including a pair of feet which act against each of said parts which are to be separated and against a protruding element located below the piece in the region of the groove.

BACKGROUND OF THE INVENTION

Until a few years ago the cutting of surfacina pieces (floors, walls, roofs, etc.) into portions was carried out simply by hand with percussion tools which were used to first mark the region to be cut stroke by stroke so that it could then be broken along the line defined. This system obviously had considerable drawbacks, some of which were due to the fact that it was impossible to mark a straight and continuous break line, and others due to the difficulty in ensuring that the break took place correctly along a line which was discontinuous and irregular. The resultina pieces or fractions, when it was possible to separate them along said cutting line (which was not always the case, the incorrectly separated parts being unused), ended up with completely irregular edges and to fit them perfectly was practically impossible when forming, for example, internal or external corners, or in other cases where whole pieces could not be used.

Later on, machines for carrying out this operation appeared, using basically a cutting tool, either a hard tip or a disc, fixed to a support which could slide along suitable manually operated guides and with which it was possible to define a straight, uniform cutting line which cracked the piece to be cut and enabled the portions to be separated cleanly either by means of a light dead blow or, later on, using another tool, eliminating the risk of breakage in a region other than the one marked.

There exist various devices to make breakage easier, both manual tools operating like pliers and static tools based on oscillating levers. All of these devices are based on the application of pressure at two points located on either side of the breakage line on the visible side of the piece and another point or region located on the reverse side of the piece and coinciding with the plane in which the breakage line lies.

In any case, the use of two independent elements, (cutter and breaker) means the piece must first be removed from the first element to be subjected to the operation of the second one. Furthermore, the known devices, especially as far as the manual type

is concerned, are difficult to use with thicker ceramic pieces and are of no use with harder materials, such as stoneware or the like. The static devices have the drawback that they too are designed for use in practice only with ceramic pieces of certain predetermined thicknesses and not with hard materials (stoneware and the like), which must still be cut either manually, with a disc part-off machine or with other devices which are more complicated to use and not always reasonably priced.

There also exist machines which to some extent eliminate the above mentioned drawbacks, it being unnecessary to remove the pieces to be cut from the place where the breakage line is marked in order to carry out the operation of separating the portions defined, but where, by simply actuating a suitable lever, independent from that of the cutting tool control, it is possible to break and separate with ease the portions as marked.

Said levers, which are joined at their lower end by a spring, are actuated by a common cam which acts on the respective lower ends and which is controlled by a manual actuating lever.

These machines therefore require more than one actuating lever and furthermore, because of the common cam mechanism, break the piece at only one point.

On the other hand, the cutting tool is mounted on a cylindrical shaft joined to the sliding support. The shaft is fixed to the support by the force exerted by the end of the actuating lever which is screwed to the support.

The tool handle has a cylindrical shape and is therefore liable to rotate about its axis of symmetry, and thus the tool can become incorrectly positioned.

Finally, known machines are provided with a device for positioning the piece to be cut. In particular there exist positioning devices which comprise a fixed stop rule located at one end of the machine, an element which can be moved linearly along the length of a guide and a rotating element connected to the linearly movable element.

According to one embodiment, it is the fixed rule itself which guides the linearly movable element, the free end of said element forming an arc at the end of which the rotating element can pivot.

The rotating element has a stop plane which can be arranged in any angular position relative to the axis of symmetry of the machine and move along said machine by means of the linearly movable element.

In this way the piece can be cut at any angle and with the piece at any position on the machine.

However, with these devices it is not possible to know the cutting angle accurately and they are therefore unreliable when making repeated cuts at the same angle.

Furthermore, the piece is only supported in one plane (the stop plane of the rotating element) and its

position cannot be guaranteed, since the piece may move when the operations of cutting and separation are carried out.

DESCRIPTION OF THE INVENTION

The machine of the invention eliminates the above mentioned drawbacks and introduces other advantages which are described below.

The machine for cutting/separating flat pieces of ceramic and the like which forms the object of the invention is of the type which comprises a sliding support bearing a tool for cutting or marking the flat ceramic piece, said cutting tool marking the piece with a groove, and further comprises a mechanism for separating said piece into two parts along said groove, said mechanism including a pair of feet which act against each of said parts which are to be separated and against a protruding element located below the piece in the region of the groove, and is characterized in that the separating mechanism forms an integral part of the same sliding support which bears the cutting or marking tool and is actuated by the same lever which is used for actuating said tool.

This feature makes it possible to achieve a more compact assembly of the machine and to carry out the cutting or marking operation and the separating operation using only one hand.

Advantageously, the sliding support comprises means for positioning the separating mechanism, said means enabling the separation feet to be arranged at two extreme positions, a high position above the cutting or marking tool, and a low position below said tool.

In this way, when the separation feet are in the high position the operation of cutting or marking the piece is carried out, and when they are in the low position the operation of separation is carried out.

According to one preferred embodiment of the invention the means for positioning the separating mechanism comprise a lever which includes a pair of arms which pivot on the sliding support, each one provided with a grooved cam in which slides a spigot which forms an integral part of each of said feet, said spigot being guided such that its movement is substantially vertical, the extreme positions, high and low, of the feet corresponding to the extreme positions of said spigots in the grooved cams.

By means of said lever it is easy to arrange the separation feet in the correct position.

Another characteristic of the invention is that the element protruding from the separating mechanism located below the piece is a rib provided along the length of the machine.

By means of this rib it is possible to separate the piece into two parts with the separation feet in any position on the machine. It also ensures a perfect separation of the piece.

Advantageously, said rib is arranged between two surfaces which act as a support base for the flat piece of ceramic and which are deformed by the action of the feet of the separating mechanism such that the rib protrudes.

In this way said rib can be fixed, thereby maintaining a high rigidity.

Also advantageously, the machine of the invention comprises a stop rule which slides in a direction which is transverse to the movement of the sliding support and which rotates about a pivot point.

This rule enables the piece to be arranged at any location on the machine support and in any angular position.

The machine further comprises a pair of cylindrical bars along which the sliding support is guided, and a second pair of bars whose resisting moment to bending is greater than that of said cylindrical bars, said second bars being arranged below the cylindrical bars and embedded in the sliding support such that they can withstand the reaction of said support when the feet act on the piece, after the cylindrical guide bars have been slightly deformed.

The cylindrical bars carry out the function of guiding the sliding support but have a reduced resistance to bending. These second bars prevent the cylindrical bars from being deformed due to the strong forces produced when the piece is separated into two parts.

On the other hand, the machine which forms the object of the present invention is characterized in that the cutting tool is mounted on a shaft which comprises means for positioning the shaft relative to the sliding support.

According to one preferred embodiment of the invention, the means for positioning the cutting tool shaft relative to the sliding support comprise at least one projection on the sliding support and at least one recess in said shaft, said projection and said recess being mutually coupled.

Advantageously, the projection or projections are formed on a bushing of hard material mounted on the sliding support.

According to another feature of the invention, the positioning device is characterized in that it comprises a fixed sector, graduated in angles, relative to which moves the rotating element, said rotating element comprising the guide along which moves the linearly movable element, said linearly movable element being graduated along its length.

In this way repeated cuts can be made accurately at the same angle.

Advantageously, the linearly movable element is a graduated rule provided at its free end with a stop element which presents, on one side of the rule, a tail which is substantially perpendicular to said rule and, on the other side of the rule, an extension which presents a plane which is substantially perpendicular to the rule and remote from its free end, and a plane

which forms a certain angle relative to the rule.

The pieces can thus be supported on two planes even when they are arranged at an angle to the axis of symmetry of the machine, thereby making it easier to ensure that they are correctly positioned during the operations of cutting and separation.

According to one preferred embodiment of the invention, the angle formed by the plane of the extension of the linearly movable element is 45°, which is the most usual cutting angle.

Finally, the device of the invention comprises means for fixing the position of the linearly movable element and means for fixing the position of the rotating element.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the invention be better understood, the accompanying drawings show by way of non-limiting example one practical embodiment thereof.

In said drawings, figure 1 is a side elevation view, in partial section, of the machine of the invention; figure 2 is plan view, also in partial section, of the same machine as figure 1; figure 3 shows a detail of the sliding support with the separation feet in the high position; figure 4 shows a detail of the sliding support with the separation feet in the low position; figure 5 shows a detail, in cross section, of the separation feet and the rib located below the piece; figure 6 is a side elevation view of the cutting/separating machine which forms the object of the patent; figure 7 is a plan view of a detail of the central part of the sliding support, showing one embodiment of the means for positioning the tool shaft on the sliding support; figures 8,9 and 10 show further embodiments of said positioning means; figure 11 is a detail of the positioning device with the rotating element in its rest position; figure 12 shows the same device as figure 11 with the rotating element away from its rest position; and figure 13 shows the same device as figures 11 and 12 with the linearly movable element arranged especially for the positioning of pieces which have large dimensions.

DESCRIPTION OF PREFERRED EMBODIMENTS

As shown in figures 1 and 2, the machine for cutting/ separating flat pieces of ceramic and the like which forms the object of the present invention comprises a sliding support 1 which carries a tool 2 for cutting or marking the flat ceramic piece 3 (figures 3 to 5) and a mechanism for separating said piece including a pair of separation feet 4,5.

As can be seen, the separation feet 4,5 form an integral part of the sliding support 1 which carries the cutting or marking tool 2 and are actuated by the same lever 6 which is used to actuate said tool.

As shown in figures 3 and 4, the separation feet

4,5 can be arranged at two extreme positions represented by said figures. In figure 3 the separation feet 4,5 are in the high position, above the cutting or marking tool 2, and in figure 4 they are in the low position, below said tool 2.

Said figures also show a mechanism for positioning the separation feet 4,5 consisting of a lever 7 formed by a pair of arms 8,9 which pivot on the sliding support 1 (only visible in figures 2, 3 and 4).

Each of these arms 8,9 is provided with a grooved cam 10 in which slides a spigot 11 which forms an integral part of each of said feet 4,5. This spigot 11 is guided by means of a block 12 in guides 13,14 such that its movement is appreciably vertical, the extreme positions, high and low, of the feet 4,5 corresponding to the extreme positions of said spigots 11 in the grooved cams 10.

In figures 2 and 5 a rib 15 can be seen arranged along the length of the machine. Said rib 15 is arranged between two plates 16,17 which act as a support base for the flat piece of ceramic 3 and which are deformed by the action of the feet 4,5 such that the rib 15 protrudes and comes into contact with the piece 3 in order to carry out the operation of separating said piece.

Figures 1 and 2 show a stop rule 18 joined to a graduated rule 19 which can slide in the direction of the arrows A. The stop rule 18 can also be rotated about a pivot point 20.

The same figures 1 and 2 show a pair of cylindrical bars 21,22 which guide the sliding support 1 and a second pair of bars 23,24 (only one bar is visible in each figure) which are rectangular in cross section.

The rectangular bars 23,24 are arranged below the cylindrical bars 21,22 and embedded in the sliding support 1 such that they can withstand the reaction of said support when the feet 4,5 act on the piece 3, after the cylindrical guide bars 21,22 have been slightly deformed.

The bars 23,24 are here rectangular in cross section but they could have any section which provides a resisting moment to bending greater than that of the cylindrical bars 21,22.

In order to separate a ceramic piece 3 into two parts, a groove 25 must first be made in said piece as shown in section in figure 5. Said groove is made using the cutting or marking tool 2 which is actuated by the lever 6 as shown in figure 3.

To do this the lever 7 must be in the position shown in figure 3 such that the feet 4,5 are in the high position.

The groove 25 is made by moving the sliding support 1 along the cylindrical bars 21,22 over a distance which corresponds to that which is to be marked on the piece 3.

Once the groove has been made the piece 3 is separated into two parts by means of the feet 4,5 as shown in figure 4.

In this case the lever 7 must be in the position shown in figure 4 such that the feet 4,5 are in the low position.

When the lever 6 is moved in the direction of arrow B the front end 6a thereof moves in the direction of arrow C, since the lever 6 pivots on the sliding support 1 by means of a spigot 26. This movement is translated into a movement of the feet 4,5 in the direction of arrow D. Then the plates 16,17 deform and the rib 15 comes into contact with the piece 3, causing the piece to break along the groove 25.

Figure 6 shows the machine for cutting/separating which forms the object of the patent. As can be seen, said machine comprises a sliding support 1 bearing a tool 2 for cutting or marking the flat ceramic piece 3, said cutting tool 2 marking the piece with a groove 25, and further comprises a mechanism 4 for separating said piece 3 into two parts along said groove 25.

The separating mechanism 4 forms an integral part of the same sliding support 1 which bears the cutting or marking tool 2 and is actuated by the same lever 6 which is used to actuate said tool 2.

As figure 7 shows, the cutting tool 2 is mounted on a shaft 30 comprising a projection 31 on the sliding support and a recess 32 in said shaft 30, said projection 31 and said recess 32 being mutually coupled.

The projection 31 is formed on a bushing 33 of hard material mounted on the sliding support 1.

In the embodiment shown in figure 7, the projection 31 and the recess 32 are triangular in section.

The shaft 30 has a plane 34 to which is applied the end of the actuating lever 6, which is screwed to the sliding support 1.

Figure 8 shows another embodiment of the means for positioning the shaft 30 in the bushing 33, where the mutually coupled projection 31 and the recess 32 are rectangular in section.

Figure 4 shows a further embodiment of the means for positioning the shaft 30 in the bushing 33, where the mutually coupled projection 31 and the recess 32 are semicircular in section.

Figure 10 shows another embodiment with three projections 31.

Several possible embodiments of the positioning means have been described, but it is understood that said means could be of any other shape. For example, instead of a recess or a number of recesses in the shaft and a projection or a number of projections on the sliding support, it could be the reverse, i.e. a projection or a number of projections on the shaft and a recess or a number of recesses in the sliding support.

As can be seen from figures 11 to 13, at one end of the base 102 is placed the positioning device 107 which forms an object of the invention, which comprises a fixed stop rule 108, an element 109 which can be moved linearly along a guide and rotating element 110 connected to said element 109.

The positioning device comprises a fixed sector 111, graduated in angles, relative to which moves the rotating element 110, said rotating element 110 comprising the guide 112 along which moves the linearly movable element 109, said linearly movable element 109 being graduated along its length.

As the figures show, the linearly movable element is a graduated rule 113 provided at its free end with a stop element which presents, on one side of the rule, a tail 114 which is substantially perpendicular to said rule 113 and, on the other side of the rule, an extension 115 which presents a plane 116 which is substantially perpendicular to the rule 113 and remote from the free end thereof, and a plane 117 which forms an angle of 45° relative to the rule.

The device further comprises a lever 118 for fixing the position of the graduated rule 113 and a lever 119 for fixing the position of the rotating element 110.

Figures 11 to 13 show various applications of the positioning device of the invention.

In figure 11 the positioning device can be seen applied to a piece 120 which has small dimensions. In this case, the piece 120 is supported on two planes, i.e. the plane formed by the fixed rule 108 and the plane 116 of the extension 115, thereby ensuring that the piece is correctly positioned during the operations of cutting and separation.

Furthermore, the graduated rule 113 makes it possible to know the position accurately. By means of the lever 118 the position can be fixed for carrying out repeated cuts.

Shown in broken lines in the same figure is another piece 121 which is guided by the plane 117 arranged at 45°.

Figure 12 shows the positioning device also applied to a piece 122 which has small dimensions and which is to be cut at a certain angle.

In this case the piece is again supported on two planes, i.e. the plane formed by the rotating element 110 and the plane 116 of the extension 115, thereby ensuring that the piece is correctly positioned.

As in figure 11, the graduated rule 113 enables to know the position accurately, but now there is also an angular displacement which can be measured using the graduated angular sector 111.

The position of the positioning device 107 can be fixed by means of the levers 118 and 119.

Figure 13 shows the positioning device further applied to a piece 123 which has large dimensions.

In this case, the piece 123 is supported on two planes, i.e. the plane formed by the fixed rule 108 and the plane 124 of the extension 114, thereby ensuring as in the previous cases that the piece is correctly positioned during the operations of cutting and separating.

In the same way, the graduated rule makes it possible to know the position accurately and, by means of the lever 118, the position can be fixed for

carrying out repeated cuts.

Claims

1. A machine for cutting/separating flat pieces of ceramic and the like which comprises a sliding support (1) bearing a tool (2) for cutting or marking the flat ceramic piece (3), said cutting tool (2) marking the piece with a groove (25), and which further comprises a mechanism for separating said piece (3) into two parts along said groove (25), said mechanism including a pair of feet (4,5) which act on each of said parts to be separated and against a protruding element located below the piece (3) in the region of the groove (25), characterized in that the separating mechanism (4,5) forms an integral part of the sliding support (1) which bears the cutting or marking tool (2) and is actuated by the same lever (6) which is used to actuate said tool.
2. A machine according to claim 1, characterized in that the sliding support (1) comprises means (7 to 14) for positioning the separating mechanism which enable the separation feet (4,5) to be arranged in two extreme positions, a high position above the cutting or marking tool (2), and a low position below said tool (2).
3. A machine according to claim 2 characterized in that the means (7 to 14) for positioning the separating mechanism comprise a lever (7) which includes a pair of arms (8,9) which pivot on the sliding support (1), each of these arms (8,9) being provided with a grooved cam (10) in which slides a spigot (11) which forms an integral part of each of said feet (4,5), said spigot (11) being guided such that its movement is substantially vertical, the extreme positions, high and low, of the feet (4,5) corresponding to the extreme positions of said spigots (11) in the grooved cams (10).
4. A machine according to any of the previous claims, characterized in that the protruding element of the separating mechanism which is located below the piece is a rib (15) arranged along the length of the machine.
5. A machine according claim 4, characterized in that said rib (15) is arranged between two plates (16,17) which act as a support base for the flat piece of ceramic (3) and which are deformed by the action of the feet (4,5) of the separating mechanism such that the rib (15) is made to protrude.
6. A machine according to any of the previous

claims, characterized in that it comprises a stop rule (18) which can slide in a direction which is transverse to the movement of the sliding support (1) and which can be rotated about a pivot point (20).

7. A machine according to any of the previous claims, characterized in that it comprises a pair of cylindrical bars (21,22), along which the sliding support (1) is guided, characterized in that it further comprises a second pair of bars (23,24) whose resisting moment to bending is greater than that of said cylindrical bars (21,-22), said second bars being arranged below the cylindrical bars and embedded in the sliding support (1) such that they can withstand the reaction of said support when the feet (4,5) act on the piece (3), after the cylindrical guide bars (21,22) have been slightly deformed.
8. Machine according to any of the previous claims, characterized in that the cutting tool (2) is mounted on a shaft (30) comprising means (31,32) for positioning the shaft (30) relative to the sliding support (1).
9. Machine according to claim 8, characterized in that the means for positioning the shaft (30) of the cutting tool (2) relative to the sliding support (1) comprise at least one projection (31) on the sliding support (1) and at least one recess (32) in said shaft (30), said projection (31) and said recess (32) being mutually coupled.
10. according to claim 8, characterized in that the projection or projections (31) are formed on a bushing (33) of hard material mounted in the sliding support (1).
11. Machine according to any of the previous claims, which comprises a fixed stop rule (108) located at one end of the machine, an element (109) which can be moved linearly along a guide and a rotating element (110) associated to said linearly movable element (109), characterized in that it comprises a fixed sector (111), graduated in angles, relative to which moves the rotating element (110), said rotating element (110) comprising the guide (112) along which moves the linearly movable element (109), said linearly movable element being graduated along its length.
12. A device according to claim 11, characterized in that the linearly movable element (109) is a graduated rule (113) provided at its free end with a stop element which presents, on one side of the rule, a tail (114) which is substantially perpendicular to said rule and, on the other side of the rule,

an extension (115) presenting a plane (116) which is substantially perpendicular to the rule (113) and remote from the free end thereof, and a plane (117) which forms a certain angle relative to the rule.

5

- 13.** A device according to claim 12, characterized in that the angle formed by the plane (117) of the extension (115) of the linearly movable element is 45°.

10

- 14.** A device according to any of the previous claims, characterized in that it comprises means (118) for fixing the position of the linearly movable element (109).

15

- 15.** A device according to any of the previous claims, characterized in that it comprises means (119) for fixing the position of the rotating element (110).

20

25

30

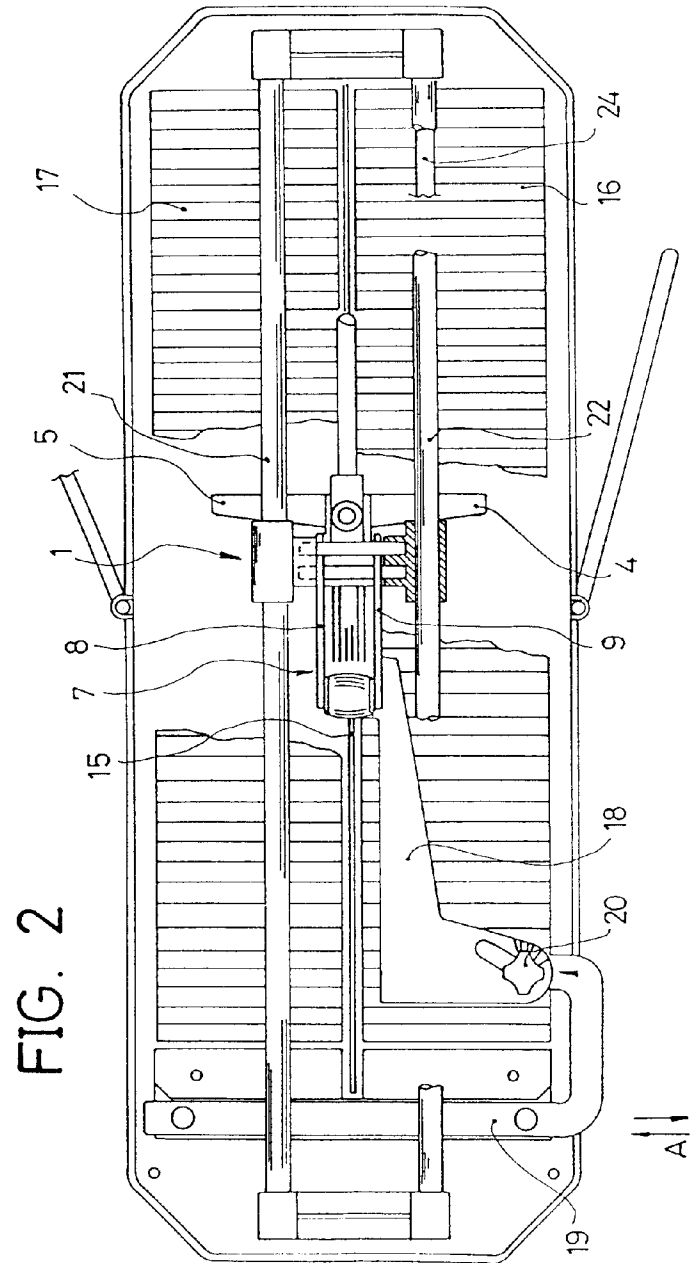
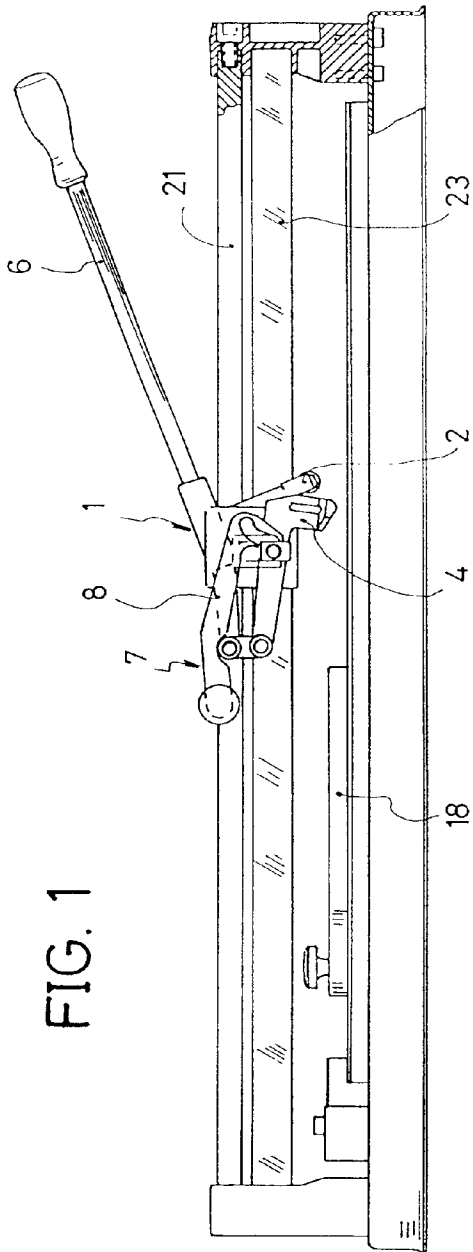
35

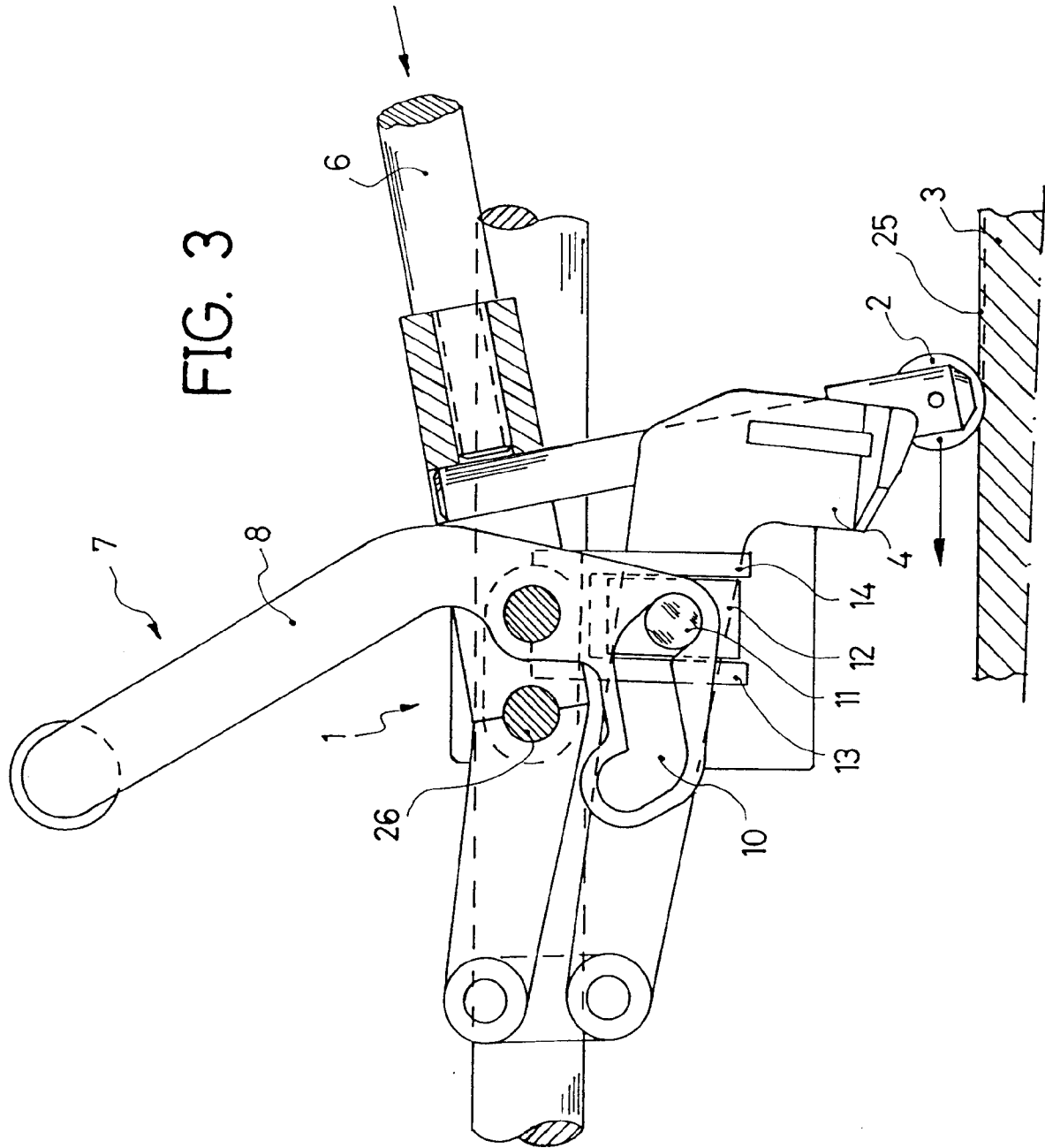
40

45

50

55





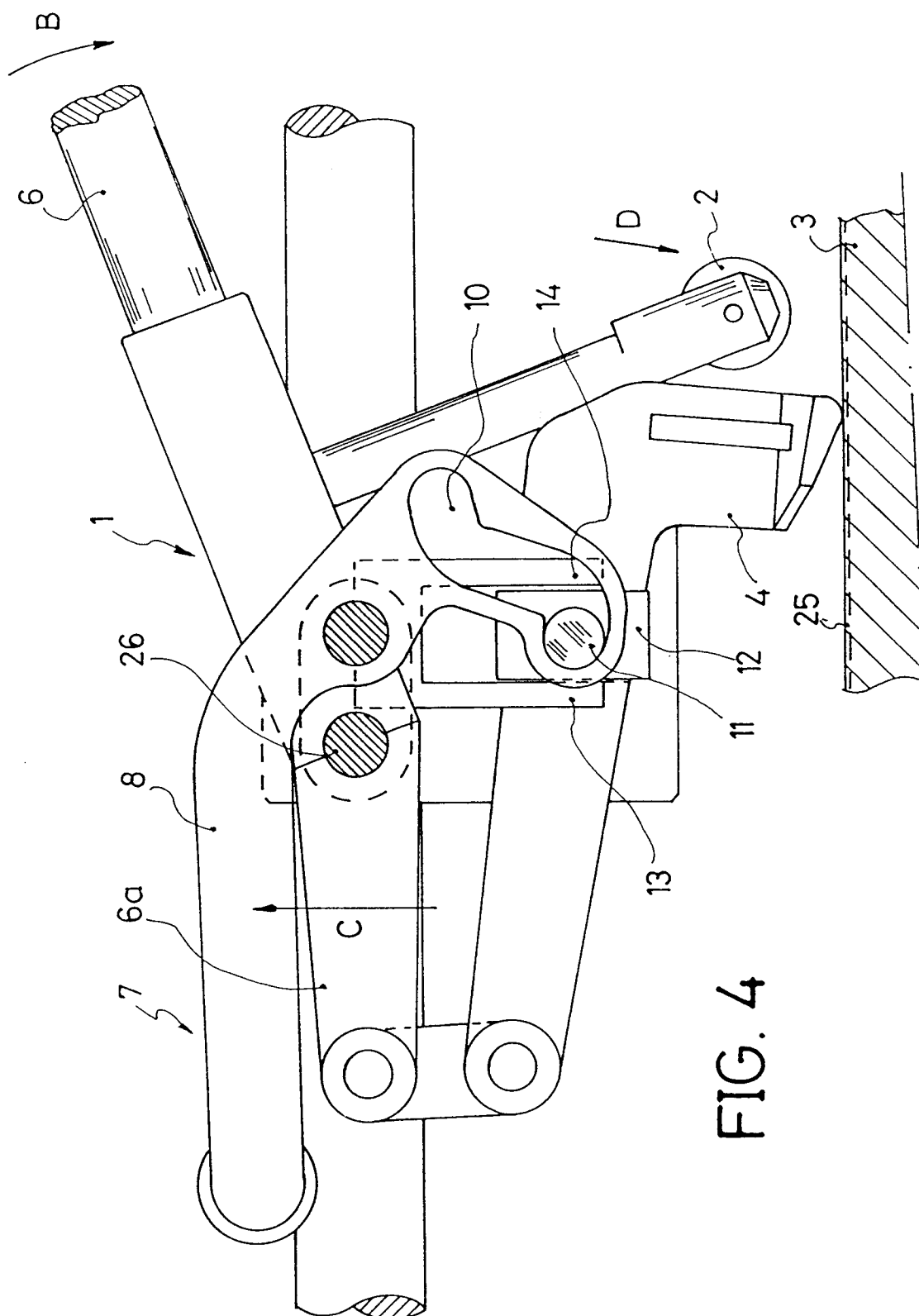


FIG. 4

FIG. 5

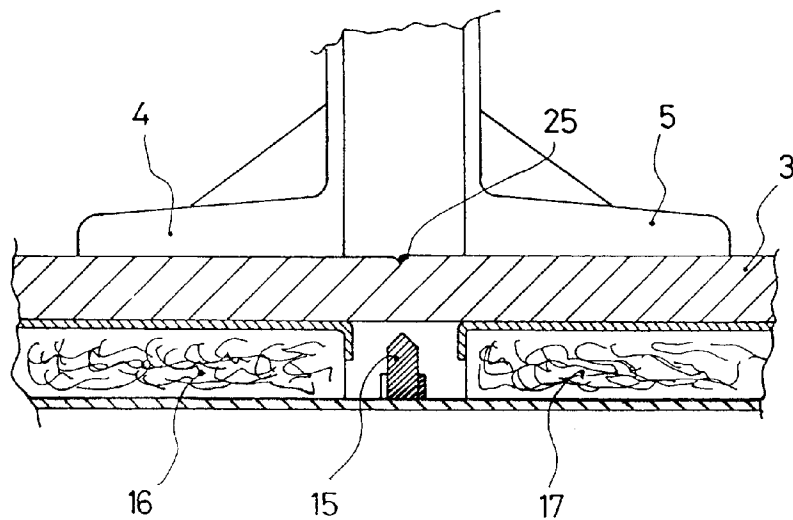


FIG. 6

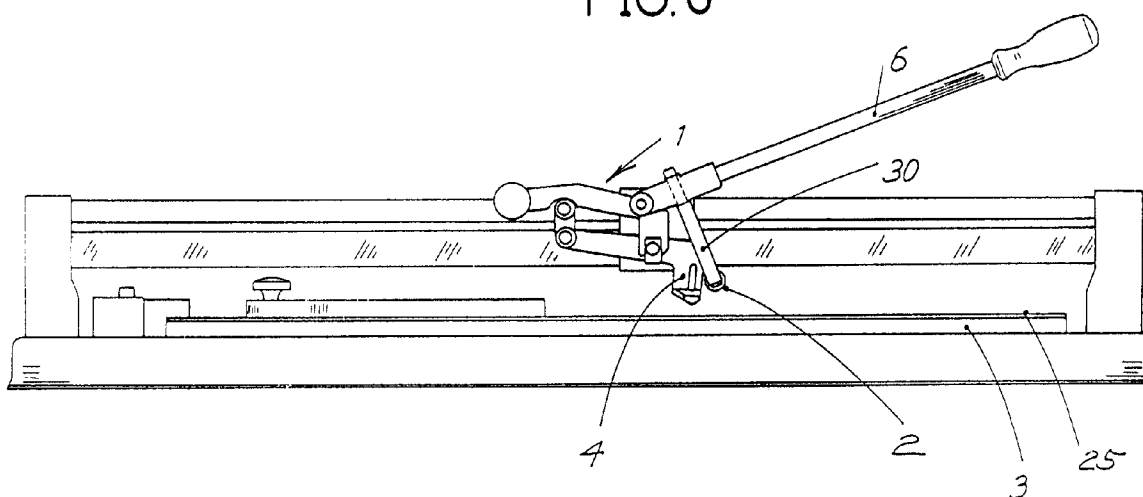


FIG.7

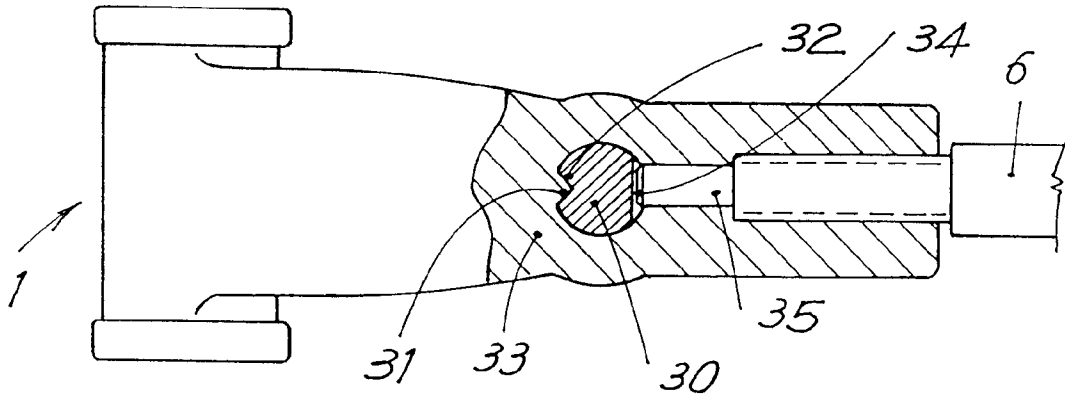


FIG.8

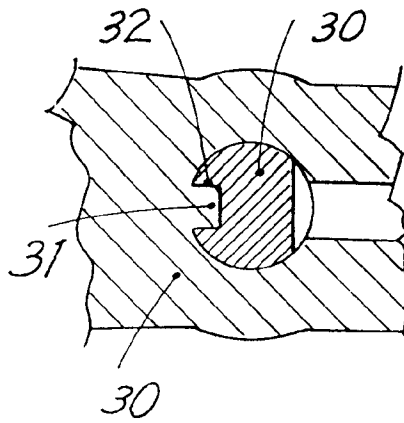


FIG.9

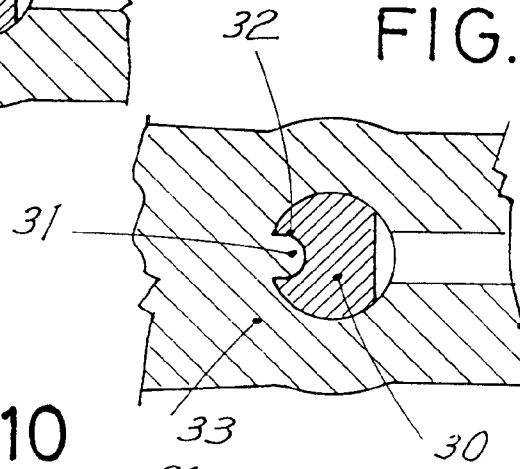


FIG.10

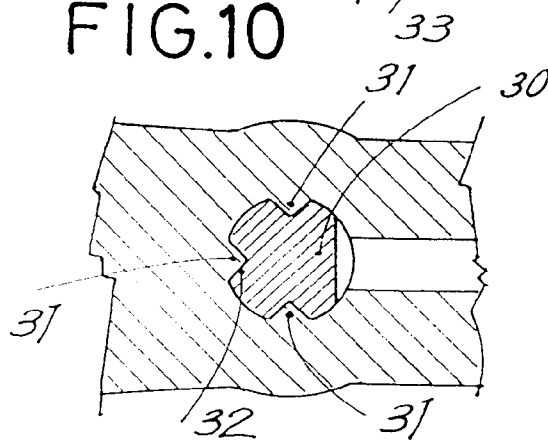


FIG.11

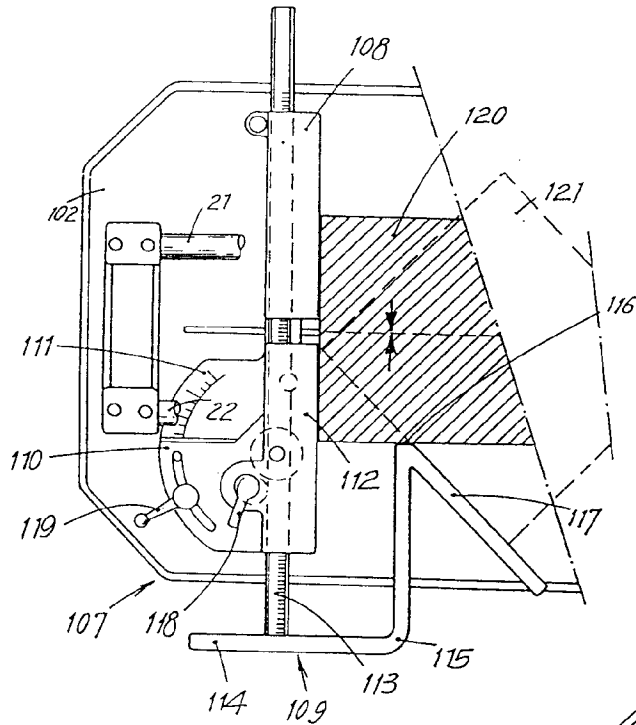


FIG.12

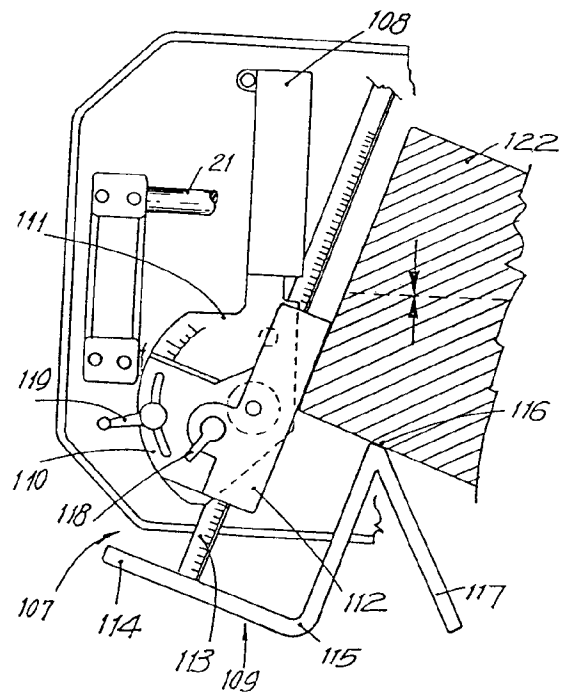


FIG.13

