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A method of straightening a knife for a beet slicer as well as an apparatus for carrying out the method.

A method of straightening a knife (1) for a root slicer, whereby a knife (1) is straightened, which in the straightened state comprises a plate-shaped securing member (5) as well as a corrugated cutting blade (4) connected to said securing means, the crests and troughs of said corrugated cutting blade being positioned between two parallel planes, whereby the securing plate (5) and the corrugated cutting blade (4) are mutually staggered to their respective side relative to a common plane (8). During the straightening process, the securing plate (5) and the corrugated cutting blade (4) of the knife (1) are separately retained and then subjected to a bending process about a longitudinal line (2, 9) extending substantially in the common plane (8) inside a transition zone (2) between the corrugated cutting blade (4) and the securing plate (5).

An apparatus for carrying out the method comprises clamping means (13, 17) clamping the corrugated cutting blade and clamping means (28 and 29) clamping the securing plate. The latter clamping means (28, 29) are pivotally mounted about a line (25) of rotation, and by turning about said line the knife (1) is subjected to a bending towards the top side (70) and subsequently the bottom side (71) and finally backwards towards the top side (70) to a predetermined degree.

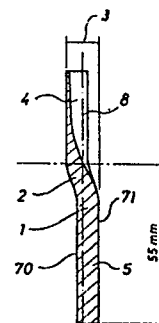


Fig.3

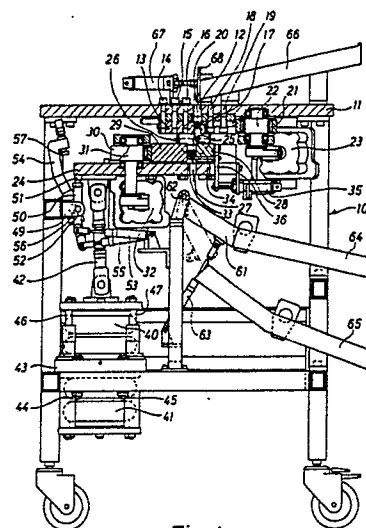


Fig.4

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A method of straightening a knife for a root slicer as well as an apparatus for carrying out the method

The invention relates to a method of straightening a knife for a root slicer, whereby the knife in the straightened state comprises a plate-shaped securing member as well as a corrugated cutting blade connected to said securing means, the crests and troughs of said corrugated cutting blade being positioned between two parallel planes, and whereby the securing plate and the corrugated cutting blade are mutually staggered to their respective side relative to a common plane.

Root slicers often comprise a large number of so-called slicing knives, which are subjected to a violent treatment because the beets are of a varying quality and contain large or small amounts of stones and gravel or other foreign bodies. Consequently, the slicing knives often require a repair and sometimes already when used for only eight hours. The knives are usually made of steel, and only the outermost about 20 mm of the cutting blade of the knives have been induction hardened. Completely hardened steel is not used because stones and the like might splinter the knife and cause so much damage during the running of the root slicer that the knife cannot be repaired and used again. When the knives are to be repaired, they are removed from the root slicer and washed. Subsequently, they are sharpened, straightened and milled before they are ready for use again. According to the conventional straightening only the outermost 25 mm of the cutting blade along the edge of the knife are straightened, said procedure being carried out while the knives are passing opposing rolls in a direction parallel to the edge of the knife. The rolls are spaced a distance slightly smaller than the height of the cutting blade, and since the rolls on one side of the blade are simultaneously staggered relative to the rolls on the opposite side the blade is subjected to a wavy movement like the one used in traditional straightening methods within the iron industry in connection with straightening of wires, plates and sectional bars. All the material undergoing the treatment is subjected to a bending forwards and backwards, whereby the material is pulled into position. The bending procedure is, however, not carried out simultaneously all over the material, but gradually as the rolls push one way or the other. In practice it has turned out that the resulting blade discloses a permanent bending according to the roll finishing the treatment of the blade. At the same time the processed slicing knife often still presents bendings or dents extending beyond the treated area with the result that after the repair the state of the slicing knife reduces the resistance of said knife to impacts compared to a new knife.

The cutting edge of the knife is usually sharpened before the straightening treatment by means of an emery stone or an ordinary milling machine, said treatment involving removal of the old edge and possible splinters. The resulting straight edge is subsequently processed in an automatic milling machine, whereby the edge is re-formed.

The object of the invention is to provide a method, whereby the knives are subjected to a straightening all over their entire width, and which is simultaneously easily carried out and results in a uniform product.

The method according to the invention is characterised in that the securing plate and the corrugated cutting blade of the knife are separately retained and then subjected to a bending process about a longitudinal line extending substantially in said common plane inside a transition zone between the corrugated cutting blade and the securing plate. The resulting slicing knife is straightened both along the cutting edge and all over its entire width, said processing therefore being far better than the previous processings. In addition the processing is relatively simple and easy to carry out as according to the circumstances the bendings are carried out forwards and backwards one or more times about the line in question.

According to the invention it is particularly advantageous that the securing plate and the corrugated cutting blade of the knife are first mutually bent about 10° towards the top side of the knife, i.e. to the side the corrugated cutting blade is staggered relative to the securing plate, and subsequently bent about 10° towards the opposite side, i.e. the bottom side, of the knife, and finally bent backwards towards the top side of the knife to such a degree that when being released the springing-back effect of the knife material causes the corrugated cutting blade and the securing plate to automatically adjust themselves substantially parallel to the common plane, the top side of the corrugated cutting blade being spaced a predetermined distance from the bottom sides of the securing plate.

In case a control measurement of the knife is not completely satisfactory, the latest bending backwards towards the top side of the knife may be repeated one or several times to an increasing degree.

The invention relates furthermore to an apparatus for carrying out the method. The apparatus is characterised in that it comprises two sets of clamping means clamping the securing plate and the corrugated cutting blade, respectively, of the knife in the staggered position relative to the com-

mon plane, and that the first set of clamping means is pivotally mounted about an axis of rotation, which extends both in said common plane of said knife clamped in the clamping means, and within a transition zone between the corrugated cutting blade and the securing plate of said knife, and that means are provided for a controlled turning of the first set of clamping means about said axis of rotation relative to the second set of clamping means. In this manner a straightening of the cutting edge both along the cutting edge of the corrugated blade and transverse thereto over the entire width of the knife is obtained.

According to the invention the first and the second set of clamping means may each comprise both a jaw fixedly mounted at least during the mounting of the knife, and a movable jaw, and the fixed jaw of the set of clamping means clamping the corrugated cutting blade may comprise a surface being wavy corresponding to the corrugated cutting blade, whereby a particularly good retaining of especially the corrugated blade of the knife is obtained at the same time as it is avoided that said corrugated blade is deformed.

According to the invention the corrugated blade of the knife may be clamped in the second set of clamping means, said second set of clamping means being activated before the first set of clamping means. As a result, it is possible for the corrugated cutting blade of the knife to position itself correctly relative to the wavy surface of the fixed jaw.

The apparatus may according to the invention furthermore be characterised in that it comprises a feeding device receiving a supply of knives and feeding the knives one by one to the clamping means, and that the first set of clamping means is mounted on a common tilting plate pivotally mounted below a fixed top plate, the second set of clamping means being mounted on said fixed top plate, and that the top plate and the tilting plate comprise slots through which the knives are both fed to the clamping means and are removed therefrom by virtue of the gravity upon the completed straightening, retractable stop means being provided for gripping and correctly positioning the knives in the clamping means before said clamping means are caused to clamp each knife. The resulting apparatus allows an automatic straightening of the slicing knives, which upon release from the feeding device can fall individually downwards through the slot in the top plate and be received in the correct position between the clamping means by means of the stop means. Subsequently the straightening is carried out, and hereafter the straightened knife can fall freely further downwards through the slot in the tilting plate when the clamping means and the stop means have been re-

tracted.

Furthermore according to the invention the movable members of the clamping means may be caused to enter the clamping position by their respective pivotally mounted eccentric device, which are turned by means of a pneumatic or hydraulic cylinder, and that the clamping means are opened by the effect of respective spring means, whereby an advantageous and simple activation of the clamping means is obtained.

Moreover according to the invention the tilting plate may be moved by means of a double-acting cylinder through a bar pivotally mounted at both ends and an insertable stop means may be provided which can be inserted in the moving path of the tilting plate so as to fix said tilting plate during a control measurement of the straightening of the knife, while the second set of clamping means are caused to enter the open position. In this manner the bending is simply carried out simultaneously with the tilting plate always being placeable in the same starting position for measuring the knife and consequently for controlling whether the straightening has been correctly carried out. The control measurement is carried out while the second set of clamping means is being opened, whereas the knife is retained in the first set of clamping means on the bottom plate. When the control measurement indicates that the straightening has not been satisfactorily carried out, the straightening process can be repeated, or the knife can be removed and discarded.

Finally according to the invention insertable stop means may be provided for stopping the movement of the tilting plate in desired outer positions, whereby the bending is controlled in a simple manner.

The invention is explained in greater details below with reference to the accompanying drawing, in which

Figure 1 is a top view of a slicing knife,

Figure 2 illustrates the corrugated blade of the slicing knife, seen towards the cutting edge, i.e. in the direction of the arrow II-II in Figure 1,

Figure 3 is a sectional view taken along the line III-III of Figure 1,

Figure 4 is a side view, partially in section, of an apparatus according to the invention,

Figure 5 is a diagrammatic view on a larger scale of portions of the apparatus of Figure 4, and

Figure 6 illustrates on a larger scale portions of the apparatus of Figure 5.

The slicing knife of Figures 1-3 is of a conventional type. The knife is made of a 7 mm thick steel plate, which has been cranked almost in the middle inside a transition zone 2 in such a manner that one portion of the plate is raised 4 mm relative to the other portion thereof, whereby the knife is of a

height 3 of 11 mm. The first raised portion 4 is shaped like a zig-zag corrugated blade of a maximum thickness of 1 mm by milling away material from both sides. The cutting edge is shaped along the rim of the blade. The other portion 5 of the knife constitutes a plate-shaped securing member of the knife and serves to secure the knife in the root slicer. Two recesses 6 and 7 are provided in the securing plate 5, said recesses receiving bolts for the securing of the knife in the root slicer. The knife is usually of a length of 200 mm, and the corrugated blade 4 is usually formed with a pitch of 25, where the pitch corresponds to the distance between two succeeding crests or troughs.

As illustrated the corrugated blade is shaped with crests and troughs between two parallel planes, and the corrugated blade 4 and the securing member 5 are mutually staggered relative to a common plane 8.

In use, especially the corrugated blade 4 is provided with dents because of stones, and it is particularly these dents as well as other distortions adjacent the cutting edge 9 which should be straightened when the knife has been used for a number of hours.

The apparatus illustrated in Figure 4 for carrying out the straightening process comprises a frame provided with the general reference numeral 10. The frame 10 supports a horizontal top plate 11 comprising a slot 12 in the centre. A damaged knife may pass through the latter slot. A fixed jaw 13 is secured to the bottom plate by means of suitable securing means, such as bolts 14, 15 and 16, and a movably mounted jaw 17 is secured to the bottom plate 11 by means of bolts 18 and 19, the jaws 13 and 17 being provided on the bottom surface of the top plate 11 on each side of the slot 12. Spring means 20 are provided between the jaws outside the area of the slot 12, said spring means subjecting the jaws 13 and 17 to a prestressing away from one another.

The movable jaw 17 is adapted to be moved inwards towards the fixed jaw 13 by means of an eccentric device 21 mounted on an axis 22 caused to be rotated by means of a pneumatic cylinder 23.

A bottom plate 24 is provided at a level below the top plate 11, said bottom plate being pivotally mounted in a manner not described in greater details about a line 25 of rotation, cf. especially Figure 6, by means of a bearing indicated by means of a circle 26 indicated by a dotted line. The bottom plate 24 comprises also a slot 27 allowing passage of straightened knives. A fixedly mounted jaw 28 and a movable jaw 29 are provided on top of the bottom plate 24 on each side of the slot. The movable jaw 29 is caused to approach the fixed jaw 28 by means of an eccentric device 30 pivotally mounted on a shaft 31. The shaft 31 is

driven by a pneumatic cylinder 32 secured to the bottom side of the bottom plate 24. Spring means 33 are provided between the fixed jaw and the movable jaw 29, said spring means prestressing the movable jaw 29 in a direction away from the fixed jaw 28.

Two displaceably mounted pins 34 extend through the fixed jaw 28, only one pin appearing from Figure 4. The pins are inserted into the slot between the fixed jaw 8 and the movable jaw 29 by means of three pneumatic cylinders 35 and a connecting plate 36. Here the pins co-operate with a knife 1 received in the slot, said pins 34 being received in their respective recess 6 and 7 in the securing plate 5 of the knife 1. In this position a knife 1 fed through the slot 12 in the top plate 11 is situated with the securing plate 5 placed between the jaws 28 and 29 mounted on the bottom plate 24, whereas the corrugated blade 4 is positioned between the jaws 13 and 17 mounted on the bottom side of the top plate 11. The sets of jaws are mutually spaced such that in the clamped state they clamp while influenced by the eccentric devices 21 and 30 a knife in a position with a correct knife height 3, such as clearly shown in Figures 5 and 6.

Opposite the corrugated blade 4 of a knife, the surface of the fixed jaw 13 on the bottom side of the top plate 11 is shaped with a wavy surface corresponding to the corrugated blade for receiving said knife, cf. Figure 4 and more specifically Figure 6.

The turning or tilting movement of the bottom plate 24 is initiated by means of a double-acting cylinder in form of two bellows cylinders 40 and 41 mounted on the frame 10. The bellows cylinders are alternately being inflated and actuate the tilting plate 4 through a connecting bar 42 pivotally mounted in both ends. The two bellows cylinders 40 and 41 are mounted on a common central plate 43 secured to the frame 10 by means of bolts 44 and 45. The bellows cylinders are interconnected by means of spacing bars 46 and 47. When pressurized air is fed to the upper bellows cylinder 40, the bottom plate 24 acting as tilting plate is moved upwards clockwise about its line of rotation 25, seen in relation to Figure 4. When air is fed to the lower bellows cylinder 41 while the upper bellows cylinder 40 is ventilated, the tilting plate 24 is turned counter-clockwise about its line of rotation. The use of the bellows cylinders implies that the forces for moving the tilting plate are of equal strength in both directions. A measuring stop means 50 is pivotally mounted on a bracket 49 on the frame 10. The upper end of the measuring stop means 50 is adjustable relative to the remaining portion of the measuring stop means in a direction towards and away from the axis 52 of rotation of

said measuring stop means 50. The measuring stop means 50 is adapted to be turned into or away from abutment with the bottom side of the tilting plate 24 by means of a pneumatic cylinder 53. The tilting plate 24 can always be stopped in a specific position by means of the measuring stop means. A control measurement of the knife 1 being straightened can always be carried out relative to the above specific position.

Furthermore a stop means 54 is pivotally mounted on the frame 10, said further stop means 54 allowing a stopping of the movement of the tilting plate 24 in a predetermined outer position in a direction clockwise about the line 25 of rotation. The further stop means 54 is turned by means of a pneumatic cylinder 55 about its axis 56 of rotation. An adjustment mechanism 57 is provided at the end of the stop means 54 opposite the end which is activated by the pneumatic cylinder 55. The adjustment mechanism 57 renders it possible to preadjust the desired tilting angle in the direction in question. Figure 5 shows a diagrammatic view of the measuring stop means 50 and the stop means 54, the adjustment possibilities of the stop means 54 being illustrated in form of three separate stop means members 58, 59 and 60.

Below the slot 27, a pivotally mounted chute 61 is provided for receiving the knives falling through the slot 27. The chute 61 is pivotally mounted about an axis 62 of rotation by means of a pneumatic cylinder 63, whereby said chute can be adjusted so as to co-operate as desired with either a magazine 64 for straightened knives or a magazine 65 for knives with defects.

The outlet of a magazine 66 for knives to be straightened is situated adjacent the slot 12 in the top plate 11. At the outlet a lock 68 is provided, said lock being activatable by means of a pneumatic cylinder 67. The lock renders it possible to release one knife at a time from the magazine 66, said knife falling downwards through the slot 12 so as to be gripped by the pins 34 projecting into the space between the lower set of jaws 28 and 29.

When the apparatus is running, one knife at a time is carried downwards between the two sets of jaws, said knives being fixed in the same position each time by means of the pins 34 and 35. In order to ensure a correct positioning of the corrugated blade 4 of the knife 1 relative to the upper set of jaws 13 and 17, said upper set of jaws is first activated to clamp the knife. Subsequently, the lower set of jaws 28 and 29 are activated to clamp the securing plate 5 of the knife. This situation is clearly shown in the diagrammatic views in Figures 5 and 6. These views show the parts directly actuating each knife. The two sets of jaws 13 and 17 and 28 and 29, respectively, are situated relative to one another in such a manner that in the

clamping position they clamp the knife 1 while influenced by the respective eccentric devices 21 and 30 in such a position that the knife present the desired height. Upon the clamping, the pins 34 are retracted from the space between the lower jaws 28 and 29.

Subsequently, the tilting plate 24 is activated by means of the upper and the lower bellows cylinders 40 and 41 in such a manner that first the plate 24 is moved clockwise by feeding pressurized air to the upper bellows cylinder and subsequently moved counter-clockwise by feeding pressurized air to the lower bellows cylinder 41 while the upper bellows cylinder 40 is being ventilated. The latter movement of the tilting plate 24 has been indicated by means of a double arrow 69 in Figure 5. The tilting movement is such that the securing plate 5 of the knife 1 is first turned 10° about the line 25 of rotation in a direction towards the top side 70 of the knife, i.e. to the side where the corrugated blade 4 is positioned relative to the securing member 5, cf. Figures 3 and 6. The following movement of the tilting plate is such that the securing plate 5 of the knife 1 is turned about 10° towards the bottom side 71 about the line 25 of rotation, cf. Figure 6.

In order to compensate for the springing-back effect of the securing plate 5, the tilting plate 24 is again tilted in a direction clockwise, and then until it engages the preadjusted stop means 54. Now the adjustment mechanism 58 of the stop means 54 is used, said mechanism allowing the shortest possible opening angle.

As illustrated in Figure 6, the jaws 13, 17 and 28 and 29 are situated in such a manner that the line 25 of rotation is positioned in the common plane 8 of the knife, and more specifically in the location of the transition zone 2 where the corrugated blade 4 meets the transition zone 2. The line 25 of rotation of the tilting plate 24 constitutes thus the bending centre of the knife 1. As illustrated in Figure 3, the latter corresponds to a distance of about 55 mm from the rim of the securing plate 5 in connection with the preferred embodiment of a knife.

When the measuring stop means 50 has been activated and the upper set of jaws 13 and 17 have been released, the tilting plate 24 is allowed to fall backwards into abutment with the measuring stop means 50. The measuring stop means is adjusted in such a manner that the corrugated blade of the knife does not come into contact with the upper fixed jaw 13 when the tilting plate abuts the measuring stop means 50. Subsequently, a control measurement of the knife is carried out, and in case the knife falls inside the desired measure, the lower set of jaws 28 and 29 are loosened, whereby the knife falls down into the chute 61. The chute 61

has been preadjusted to deliver the knife to the magazine 64 of straightened knives. In case the measurement of the knife is not satisfactory, i.e. the height of the knife is too high, the chute 61 is preadjusted to deliver the knife to the magazine 65 for knives to be discarded.

If the height 3 of the knife is measured to be too low, the upper jaws 13 and 17 are again clamped about the corrugated blade 4 simultaneously with the adjustment mechanism of the stop means 54 being activated such that the tilting plate 24 can co-operate with either the stop means member 59 or the stop means member 60 depending on whether the measured height of the knife is near or far away from the desired height. Subsequently the upper bellows cylinder 40 is activated by means of pressurized air, and the tilting plate is tilted into engagement with the chosen stop, whereby the knife is additionally bent towards the top side 70 of the knife. At the same time as the upper bellows cylinder 40 is ventilated and the tilting plate 24 falls backwards into horizontal position, the upper jaws are loosened. Usually further measurements are not necessary after the extra bending, experience having shown that the adjustment mechanism of the stop means 54 can be adjusted such that the height of the knife can be kept inside the allowed measure.

Subsequently, the lower jaws 28 and 29 are loosened, and the knife falls down into the magazine 64 for straightened knives through the chute 61. The various parts of the apparatus can be controlled by means of a programmed control device in a manner not described in greater detail, and all the movements of the apparatus are carried out by means of pressurized air fed by means of suitable conduits for pressurized air not shown.

Suitable sensors may furthermore be used for supervising whether the feeding magazine 66 contains knives and whether a knife 1 is always correctly positioned between the two sets of jaws.

A sensor is mounted in the magazine 64 for straightened knives and in the magazine 65 for knives to be discarded, said sensor registering whether a knife has passed through the apparatus so that the apparatus can continue processing the next knife. These sensors are also used for counting how many knives the straightening apparatus has straightened and how many knives have been discarded.

The invention has been described with reference to a preferred embodiment. Many modifications may, however, be carried out without thereby deviating from the scope of the invention.

Claims

1. A method of straightening a knife (1) for a root slicer, whereby the knife (1) in the straightened state comprises a plate-shaped securing member (5) as well as a corrugated cutting blade (4) connected to said securing means, the crests and troughs of said corrugated cutting blade being positioned between two parallel planes, and whereby the securing plate (5) and the corrugated cutting blade (4) are mutually staggered to their respective side relative to a common plane (8), characterised in that the securing plate (5) and the corrugated cutting blade (4) of the knife (1) are separately retained and then subjected to a bending process about a longitudinal line (2, 9) extending substantially in said common plane (8) inside a transition zone (2) between the corrugated cutting blade (4) and the securing plate (5).

2. A method as claimed in claim 1, characterised in that the securing plate (5) and the corrugated cutting blade (4) of the knife (1) are first mutually bent about 10° towards the top side (70) of the knife, i.e. to the side the corrugated cutting blade (4) is staggered relative to the securing plate (5), and subsequently bent about 10° towards the opposite side, i.e. the bottom side, of the knife, and finally bent backwards towards the top side (70) of the knife (1) to such a degree that when being released the springing-back effect of the knife material causes the corrugated cutting blade (4) and the securing plate (5) to automatically adjust themselves substantially parallel to the common plane (8), the top side (70) of the corrugated cutting blade (4) being spaced a predetermined distance from the bottom sides (71) of the securing plate (5).

3. A method as claimed in claim 2, characterised in that the latest bending backwards towards the top side (70) of the knife is repeated one or several times to an increasing degree.

4. An apparatus for carrying out the method as claimed in any one of claims 1 to 3, said apparatus being adapted to straighten a knife (1) for a root slicer, whereby the knife (1) in the straightened state comprises a plate-shaped securing member (5) as well as a corrugated cutting blade (4) connected to said securing means, the crests and troughs of said corrugated cutting blade being positioned between two parallel planes, and whereby the securing plate (5) and the corrugated cutting blade (4) are mutually staggered to their respective side relative to a common plane (8), characterised in that the apparatus comprises two sets of clamping means (28, 29; 13, 17) clamping the securing plate (5) and the corrugated cutting blade (4), respectively, of the knife in the staggered position relative to the common plane (8), and that the first set of clamping means (28, 29) is pivotally mounted about an axis of rotation (25), which extends

both in said common plane (8) of said knife clamped in the clamping means (28, 29), and within a transition zone (2) between the corrugated cutting blade (4) and the securing plate (5) of said knife, and that means (40, 41, 54) are provided for a controlled turning of the first set of clamping means (28, 29) about said axis of rotation (25) relative to the second set of clamping means (13, 17).

5. An apparatus as claimed in claim 4, characterised in that the first and the second set of clamping means (28, 29; 13, 17) each comprises both a jaw (28, 13) fixedly mounted at least during the mounting of the knife (1), and a movable jaw (29, 17), and that the fixed jaw (13) of the set of clamping means (13, 17) clamping the corrugated cutting blade (4) comprises a surface being wavy corresponding to the corrugated cutting blade (4).

6. An apparatus as claimed in claim 4 or 5, characterised in that the corrugated cutting blade (4) of the knife (1) is clamped in the second set of clamping means (13, 17), said second set of clamping means (13, 17) being activated before the first set of clamping means (28, 29).

7. An apparatus as claimed in claim 4, 5 or 6, characterised in that it comprises a feeding device (66, 67 and 68) receiving a supply of knives (1) and feeding the knives (1) one by one to the clamping means (13, 17, 28 and 29), and that the first set of clamping means (28, 29) is mounted on a common tilting plate (24) pivotally mounted below a fixed top plate (11), the second set of clamping means (13, 17) being mounted on said fixed top plate, and that the top plate (11) and the tilting plate (24) comprise slots (12, 27) through which the knives (1) are both fed to the clamping means (13, 17, 28 and 29) and are removed therefrom by virtue of the gravity upon the completed straightening, retractable stop means (34) being provided for gripping and correctly positioning the knives (1) in the clamping means (13, 17, 28, 29) before said clamping means are caused to clamp each knife (1).

8. An apparatus as claimed in claim 4, 5, 6 or 7, characterised in that the movable members (17, 29) of the clamping means are caused to enter the clamping position by their respective pivotally mounted eccentric device (21 and 30, respectively), which are turned by means of a pneumatic or hydraulic cylinder (23 and 32, respectively), and that the clamping means (13, 17, 28 and 29) are opened by the effect of respective spring means (20 and 33).

9. An apparatus as claimed in claim 7 or 8, characterised in that the tilting plate (24) is moved by means of a double-acting cylinder (40, 41) through a bar (42) pivotally mounted at both ends, and that an insertable stop means (50) is provided

which can be inserted in the moving path of the tilting plate (24) so as to fix said tilting plate (24) during a control measurement of the straightening of the knife (1), whereas the second set of clamping means (13, 17) are caused to enter the open position.

10. An apparatus as claimed in claim 7, 8 or 9, characterised in that insertable stop means (54, 58, 59 and 60) are provided for stopping the movement of the tilting plate (24) in desired outer positions.

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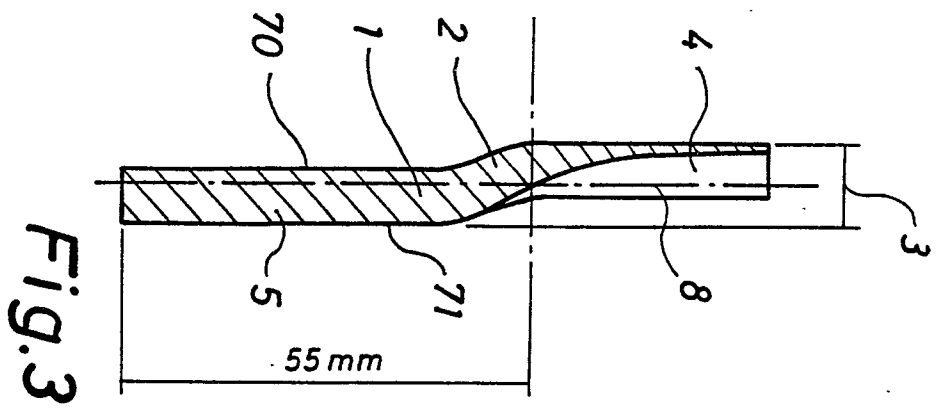
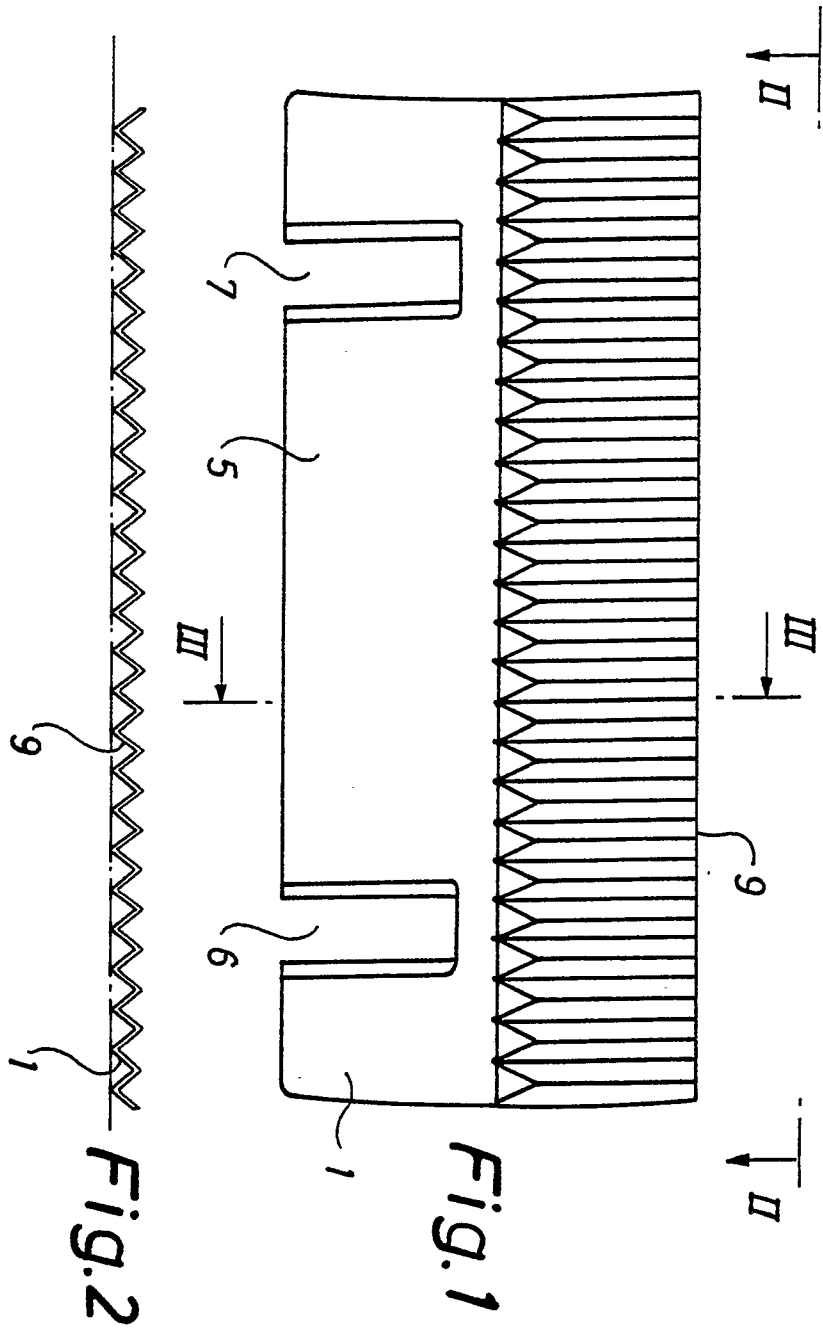
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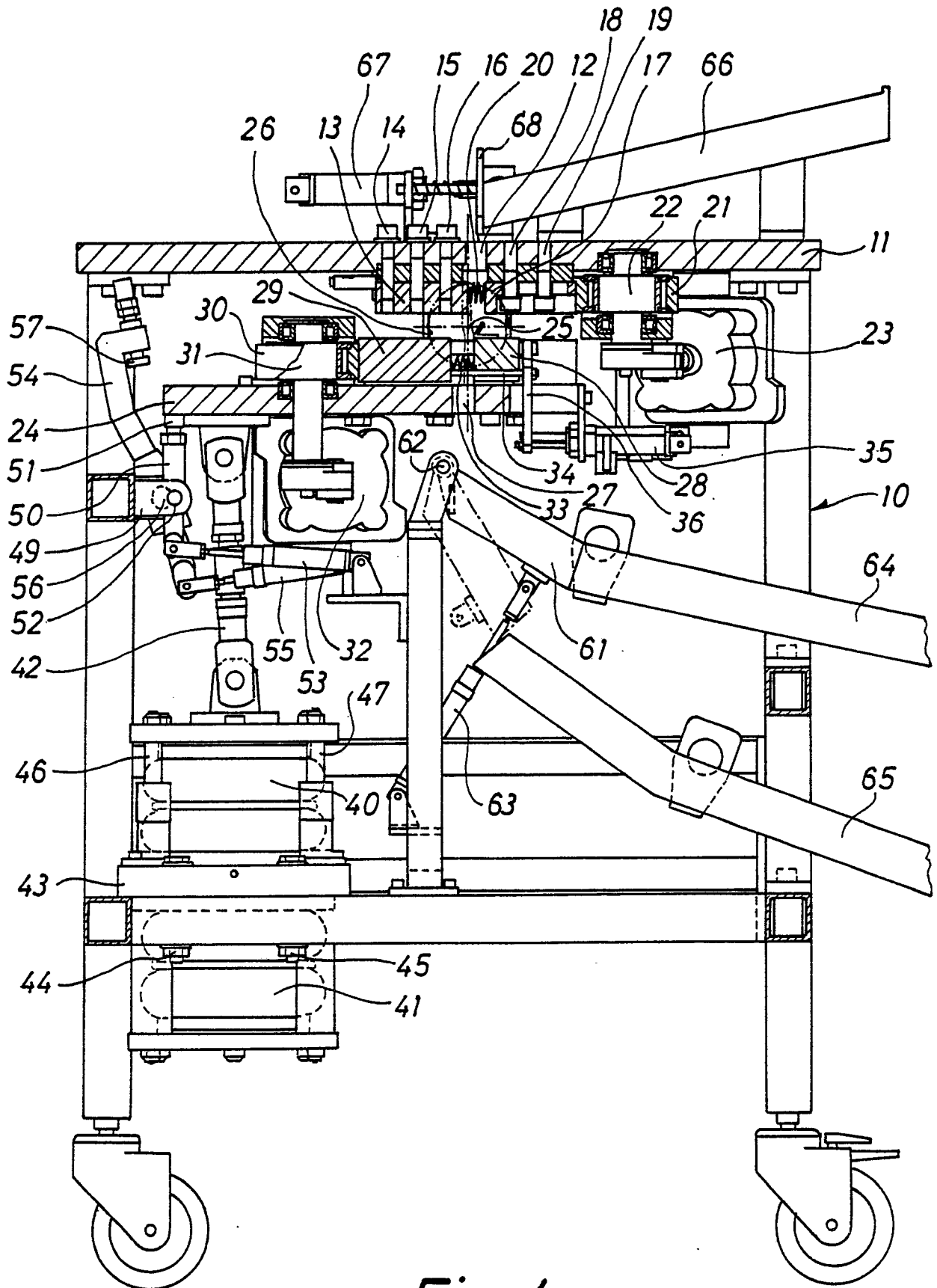


Fig. 4

