

(19)



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(11)

EP 1 574 304 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
13.09.2006 Bulletin 2006/37

(51) Int Cl.:
B26D 1/553^(2006.01) B26D 1/00^(2006.01)

(21) Application number: **04075770.0**

(22) Date of filing: **09.03.2004**

(54) **Bread slicer with knives arranged in a wave- or v-shape.**

Maschine zum Schneiden von Brot mit Wellen- oder V-förmig angeordneten Messern

Machine à couper le pain avec les couteaux rangés en v ou sous forme d'ondes

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**

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(43) Date of publication of application:
14.09.2005 Bulletin 2005/37

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(56) References cited:
**GB-A- 798 883 US-A- 1 975 942
US-A- 2 023 362 US-A- 2 092 276
US-A- 2 528 853**

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Description

[0001] The present invention relates to a device for cutting loaves of bread and other products according to preamble of claim 1.

[0002] A somewhat similar device is known e.g. from the American Patent document US 1 975 942, titled: "Bread Slicer", of HARTMAN, William, Walter, Los Angeles, California. Patent is issued on 09-10-1934. Here, it concerns a cutting mechanism for bread slicers. A cutting head consists of multiple lateral, at a distance placed knives in parallel planes, in which at one side the knives are connected to a crankshaft and at the other side are tensioned with draw springs in a rimmed stretcher, which must be constructed rather heavily due to the many springs. The drawing springs on the top side of the knives are suspended in a blunt V-shape, through which the knives start cutting the bread practically at the same time, but first the outer knives and then step by step inwardly the next pairs of knives are used, through which the bread is not pulled apart. The mentioned V-shape is achieved singularly over the whole length of the loaf or bread, through which the staggering of the knives, also due to the very blunt inner angle, is very small and in which the knife staggering is not completely used. The set-up of the knives shows an almost complete overlap, through which a high compression is created on the loaf per slice. Actually the knives form half a cone and due to the crankshaft only one cone with a very small top angle is possible. Due to the mentioned crankshaft and the V-shaped set-up of the drawing springs, the thin knives will start vibrating sooner and due to the tension of the springs of a large quantity of drawing springs a lot of energy is necessary to keep the device going to cut through the loaf or bread. Further, the exerted pressure of the pusher cannot be too high because the knives almost simultaneously cut into the loaf or bread, through which the resistance is large due to the cutting and the slices are crushed together. This is not beneficial for a beautiful result of the sliced bread.

[0003] The state of the art also comprises:

D1 (US 2 092 276, filed 18-10-1935, inventor I.C. GELLMAN) This bread slicing machine has knives staggered in a reciprocating supporting frame movably mounted upon a total carrying frame. The knives are spanned or mounted at both ends in the supporting frame.

D2 (UK 798 883, filed 21-09-1955 from the German Patent Application dated 30-08-1854, inventor Josef MUELLER, German nationality, Dortmund).

[0004] This is a general cutting machine to cut soft goods, e.g. loafs, synthetic materials and foam rubber into slices, sheets and the like, wherein the knives are arranged in three laterally over a very short distance staggered rows. The knives are alternating in each row and are carried by one of the frames. Furthermore, these knives are laterally spanned at both ends in one of these supporting frames, which are actuated by oscillating a cross-bar with hydraulic means etc.

[0005] The above described solutions for a bread slicer have a number of disadvantages, such as the heavy frames, the relatively large driving power to move the knives with drawing springs up and down and to move the very compressed slices between the mutual overlapping knives by means of friction and next also the driving power for the pusher, which also leads to excessive vibrations and many crumbs.

[0006] Further, research has shown that the set-up of the knives and the construction thereof has a large influence on the compression of, for example, cutting a bread and has further consequences, as shown hereafter.

[0007] In the known bread slicers the knives are mostly placed in almost an overlapping row. The knives, which are tensioned with a spring load of approximately 200 to 400 N and depending on the make of the slicer, have a varied thickness of 0,4 en 0,5 mm, an average of 0,45 mm, in which they are sharpened double sided. For the compression of the bread with a length of 400 mm and a required slice thickness of approximately 10 mm, can be determined with a usual thickness of the knives of 0,45 mm, e.g. In this case $400:10=40$ knives with a thickness of 0,45 mm are active. Herewith, the whole bread is forced to compress $40 \times 0,45 \text{ mm} = 18 \text{ mm}$. This compression has friction as the most important disadvantage, which develops between the knives and the bread due to the applied compression forces. The consequences are:

- wear of the knives;
- crumbling;
- sticking of the bread on the knives when the bread is still warm and/or sticky;
- pulling the bread apart between two knives moving in a different direction;
- when the feed or push speed (pusher speed) of the bread is too fast, the bread is compressed, in which the slices are permanently deformed or even broken.

[0008] Further, the tension of the known knives of 200 to 400 Newton leads to a large bending moment in the stretcher, which leads to large dimensions and has disadvantages regarding the dynamic behaviour of the bread slicer.

[0009] The aim of the present invention is to provide a bread slicer, which has a number of advantages in relation to the above described bread slicers and in which the knives are not suspended and spring tensioned. The aimed advantages concern a larger speed overlap of the knives, a lighter construction by avoiding the needed heavy stretcher and therefore less vibrations and wear and finally a much smaller exertion of force of the knives as total set exerted on the loaf, by providing a step by step cutting of the bread and that it is minimally pushed together lengthwise, by sharpening the knives in a suitable way and placing the sharpened knives in a certain manner in the double oscillating supporting frame.

[0010] In short, the aim of the present invention is to provide a very efficient bread slicer, which has a light construction, minimally crunches and/or damages the bread, needs little driving power and in which the knives can easily be changed and the reversely placed knives are still useable. Further, sharpening such knives should be as cheap as possible.

[0011] The abovementioned aim, respectively advantages is/are achieved with a bread slicer according to claim 1.

[0012] The aim of minimum power, little vibrations and minimum damage to the bread or other object is achieved.

[0013] By using knives which are sufficiently thick and broad, knives are created which are sufficiently rigid to prevent tensioning and bending. This means, that the knives are fixed and driven on one end. Through the other end of the knife only a guide is applied. The chosen thickness of the knives lies between 0,6 and 3 mm. The width of the knives lies preferably between 5 and 15 mm. By placing the single sided sharpened knives according to a certain configuration in different layers (wave or V-shape), the compression of the bread is herewith organized in such a way, that cutting the bread leads to a lower compression. Each two cooperating knives exert a reciprocal cutting movement.

[0014] Further, the device according to the invention is optionally further developed, characterized in that, the mentioned executed knives are rigidly fixed in the mentioned supporting frame on one end and on the other end oscillate in a slotted guiding construction, in which both ends of the knives are constructed as reversible use useable, and in which the mentioned knives are sharpened on one side.

[0015] The advantages are a fast changing of the knives and minimum deformation of the bread.

[0016] Furthermore, the device according to the invention is optionally further developed, characterized in that, the mentioned saw-tooth shaped set-up of the knives in a first or second supporting frame, wherein the supporting frames are driven in such a way that they mutually are moving in a reciprocal oscillating way with an eccentric gear, in which the set-up knives are sharpened per pair in one layer facing each other.

[0017] The advantages are, that the pairs of knives always move reciprocal oscillating in relation to each other and that sharpening the knives on one side is much cheaper.

[0018] The preferred construction of the invention will be described by way of example, and with reference to the accompanying drawing.

[0019] In which:

Fig. 1 shows a schematic view in oblique projection of the set-up of the bread slicer according to a preferred embodiment of the invention;

Fig. 2 shows a side view of the bread slicer according to a preferred embodiment of the bread slicer applied in figure 1;

Fig. 3 shows a view in oblique projection of the preferred embodiment of the cutting mechanism and pusher of the bread slicer;

Fig. 4 shows a bottom view in oblique projection of the cutting mechanism of the bread slicer according to figure 3;

Fig. 5 shows a bottom view in oblique projection of the supporting frame with the knives according to the invention, in which the reciprocal movement of the supporting frame is clearly visible.

Fig. 6A up to 6C show top views of the end of the knife for the usable fast fixing in the mentioned supporting frame of figure 5; and

Fig. 7 here, the reciprocal movement of the knives is shown schematically.

[0020] Figure 1 schematically shows the set-up 1 of a bread slicer with the cutting mechanism 2 and pusher 3. Further a guard 4 is applied over the cutting mechanism.

[0021] Figure 2 shows in side view the cutting mechanism 2 at an angle α of approximately 60 degrees. Here, the knives 5', 5 are shown and how they are fixed in the supporting frames 6 and 7, which can be driven with an eccentric gear 8. Here, the reciprocal movement of the knives 5', 5 is clearly seen. The knives are herewith placed in a V-shape in 5 rows (see figures 7 and 8).

[0022] Figure 3 shows a view in oblique projection of the preferred embodiment of the cutting mechanism 2. In this figure it is clearly shown that the knives 5', 5 are fixed at the bottom side in the supporting frames 6 and 7 by means of two pins, bolts or clamps 9, 10. The pusher 3 can be moved over the supporting plate 12 with the bread on it (all at 60 degrees) towards the knives 5', 5. The moving mechanism (not indicated) with guiding slots 14, 15 of the pusher 3 is clearly shown in figure 4. The movement is done by means of an electromotor, which drives the guide block 16 along the axis 17, 18. The supporting frame 6 for the knives 5', 5 moves with a bush construction 19 along the axis 20. This

is done in the same way at the supporting frame 7. The eccentric mechanism 8 with the eccentric rod 21 are clearly visible.

[0023] In figure 5 the supporting frames 6 and 7 are enlarged. The supporting frame 7 has a bush construction 22 and axis 23.

[0024] Figure 6A shows in top view the end 24 with a knife 5 with a first preferred embodiment or concept of the attachment recesses 25, 26 for the means 9, 10 of the previous figures 3, 4, 5.

[0025] Figures 6B and 6C show a second embodiment or concept of the ends of the knives 5' with the same cutting profile as knives 5, but with another attachment recess 27 for fixing into the supporting frames 6 and 7, which is done with a bent away laminated suspension spring 28 and which bent away laminated suspension spring 28 can be unlocked with a special unlocking pin 29. During use, the bent away laminated suspension spring 28 locks the knives 5'. Thus, the knives 5' can be placed in a very simple way and can be removed with an unlocking pin 29 to be placed. The extreme position of the unlocking pin 29 is against knife 5' and with that it is avoided, that the laminated suspension spring 28 is pulled further than its elastic permissible stress.

[0026] Figure 7 schematically shows the set-up of the knives in layers and the single sided sharpened direction of the knives, in which the reciprocal movement of the knives 5', 5 is indicated per pair, in which, for example, the knives 5', 5 with a + are moved upwards and the knives with a - are moved downwards at the same time.

[0027] Further, it must be noted that the mutual distance of the knives 5" can be reduced in such a way, that these lay against each other or can be joined together to a single knife 5", which gives a double sharpened knife. The movement direction of the bread is indicated with arrow A.

[0028] Finally it has to be emphasized, that the above description constitutes preferred embodiments of the invention, but that further variations and modifications are still possible without departing the scope of the claims.

Claims

1. Device for cutting loaves of bread and other products into slices comprising:

a housing to protect the user;

an intake and outlet opening for the loaves or products; supporting and guiding plates (12) for the loaves or products;

a said first and second set of knives mounted rigidly respectively on a first and second supporting frame (6, 7);

a driving mechanism for energizing the supporting frames (6, 7); and

a pusher (3) for moving the loaves or products towards the two sets of knives, wherein the knives, staggered and placed with approximately equal mutual distance, reciprocate in their longitudinal axis, and are rigidly fixed in the supporting frame on one end and on the other end oscillate in guiding slots (14, 15), said device **characterized in that**, the knives are not tensioned by springs, said knives (5', 5) are thick, broad and rigid so as to prevent bending, and in top view said knives (5', 5) are placed in rows without a mutual overlap and in a saw tooth shape, a wave or v-shape to minimise the compression of the loaves or products.

2. Device as claimed in claim 1, **characterized in that**, the mentioned rigidly executed knives (5', 5) are rigidly fixed in the mentioned supporting frame (6, 7) on one end and on the other end oscillate in a slotted guiding construction (11), in which both ends of the knives are constructed as reversible use useable.

3. Device as claimed in claims 1 - 2, **characterized in that**, the mentioned knives (5', 5) are sharpened on one side.

4. Device as claimed in claims 1 - 3, **characterized in that**, the mentioned saw-tooth shaped set-up of the knives (5', 5) in a first or second supporting frame (6, 7), wherein the supporting frames are driven in such a way that they mutually are moving in a reciprocal oscillating way.

5. Device as claimed in claims 1 - 4, **characterized in that**, the set-up knives (5', 5) are sharpened per pair in one layer facing each other.

6. Device as claimed in claims 4 and 5, **characterized in that**, each pair of knives making a cut at that moment are sharpened facing each other and each time the separate knife is mounted in the first or the second supporting frame (6, 7) and thus execute a reciprocal oscillating movement in relation to each other.

7. Device as claimed in claim 6, **characterized in that**, the mentioned knives (5', 5) have a knurl, saw-tooth, smooth or another saw shape.

8. Device as claimed in claim 7, **characterized in that**, in cross-section the mentioned knives (5', 5) have a blade thickness between 0,6 and 3 mm, a width between 5 and 15 mm and a knife length of approximately 300 mm.
9. Device as claimed in claim 8, **characterized in that**, the material of the knives is blade steel or teflonized steel.
10. Device as claimed in claim 6, **characterized in that**, the driving of the first and the second supporting frame (6, 7) is constructed by means of a balanced disc with an eccentric rod (21) connected with an eccentric mechanism (8)

Patentansprüche

1. Vorrichtung zum Schneiden von Brotlaiben und anderen Produkten in Scheiben, die Folgendes umfasst:

ein Gehäuse zum Schutz des Benutzers;

eine Eingangs- und Ausgangsöffnung für die Laibe oder Produkte;

Halte- und Führungsplatten (12) für die Laibe oder Produkte;

ein genannter erster und zweiter Satz von Messern, die auf einem ersten beziehungsweise zweiten Trägerrahmen (6, 7) starr angebracht sind;

eine Antriebsvorrichtung zum Antreiben der Trägerrahmen (6, 7); und

eine Schubvorrichtung (3) zum Schieben der Laibe oder Produkte auf die beiden Messersätze zu, wobei sich die Messer, die versetzt und etwa im gleichen Abstand zueinander angeordnet sind, in ihrer Längsachse hin- und herbewegen und an einem Ende starr in dem Trägerrahmen befestigt sind und sich an dem anderen Ende in den Führungsschlitzen (14, 15) hin- und herbewegen, wobei die Vorrichtung **dadurch gekennzeichnet ist, dass** die Messer nicht mit Federn gespannt sind, die genannten Messer (5', 5) dick, breit und steif sind, damit sie sich nicht biegen, und die genannten Messer (5', 5) in der Draufsicht in Reihen ohne gegenseitige Überlappung und in einer Sägezahnform, Wellenform oder V-Form angeordnet sind, um ein Zusammendrücken der Laibe oder Produkte auf ein Mindestmaß herabzusenken.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die erwähnten steif ausgeführten Messer (5', 5) an einem Ende starr in dem erwähnten Trägerrahmen (6, 7) befestigt sind und sich an dem anderen Ende in einer Führungskonstruktion (11) mit Schlitzen hin- und herbewegen, in der beide Enden der Messer so aufgebaut sind, dass sie doppelseitig verwendet werden können.

3. Vorrichtung nach Anspruch 1 bis 2, **dadurch gekennzeichnet, dass** die erwähnten Messer (5', 5) auf einer Seite geschärft sind.

4. Vorrichtung nach Anspruch 1 bis 3, **dadurch gekennzeichnet, dass** die erwähnte sägezahnförmige Anordnung der Messer (5', 5) in einem ersten oder zweiten Trägerrahmen (6, 7), wobei die Trägerrahmen derart angetrieben sind, dass sie sich wechselseitig umgekehrt hin- und herbewegen.

5. Vorrichtung nach Anspruch 1 bis 4, **dadurch gekennzeichnet, dass** die angeordneten Messer (5', 5) paarweise in einer Schicht geschärft sind, wobei sie sich gegenüberliegen.

6. Vorrichtung nach Anspruch 4 und 5, **dadurch gekennzeichnet, dass** jedes Paar Messer, das zu diesem Zeitpunkt schneidet, geschärft ist, wobei sie sich gegenüberliegen, und jedes Mal, wenn das einzelne Messer im ersten oder zweiten Trägerrahmen (6, 7) hochgehoben wird, und führt damit eine umgekehrte Hin- und Herbewegung zueinander aus.

7. Vorrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** die erwähnten Messer (5', 5) eine Rändelung, Sägezahn-, glatte oder eine andere Sägeform aufweisen.

8. Vorrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** die erwähnten Messer (5', 5) im Querschnitt eine Klingienstärke zwischen 0,6 und 3 mm, eine Breite zwischen 5 und 15 mm und eine Messerlänge von ungefähr 300 mm aufweisen.

9. Vorrichtung nach Anspruch 8, **dadurch gekennzeichnet, dass** das Material der Messer Klingensteinahl oder mit Teflon beschichteter Stahl ist.

10. Vorrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** der Antrieb des ersten und des zweiten Trägerrahmens (6, 7) mithilfe einer symmetrischen Scheibe mit einem außermittigen Stab (21) aufgebaut ist, der mit einer außermittigen Vorrichtung (8) verbunden ist.

5

Revendications

1. Dispositif pour couper des miches de pain et d'autres produits en tranches, comportant :

10 un boîtier pour protéger l'utilisateur,
une ouverture d'entrée et de sortie pour les miches de pain ou les produits,
des plaques d'appui et de guidage (12) pour les miches de pain ou les produits,
un premier et un deuxième ensemble de couteaux montés de manière rigide sur un premier et un deuxième
15 cadre d'appui (6, 7) respectivement,
un mécanisme de commande pour mettre sous tension les cadres d'appui (6, 7) et
un poussoir (3) pour faire avancer les miches de pain ou les produits vers les deux ensembles de couteaux,
dans lequel les couteaux, échelonnés et placés à une distance mutuelle approximativement égale, y ont un
mouvement de va-et-vient sur leur axe longitudinal et sont fixés de manière rigide dans le cadre d'appui à l'une
20 des extrémités et à l'autre extrémité oscillent dans des rainures de guidage (14, 15), ledit dispositif est **carac-**
térisé en ce que les couteaux ne sont pas tendus par des ressorts, lesdits couteaux (5', 5) sont épais, larges
et rigides de manière à empêcher qu'ils ne se plient et en vue de dessus lesdits couteaux (5', 5) sont disposés
en rangées sans se chevaucher l'un l'autre et ont une forme de dent de scie, de vague ou de V pour minimiser
la compression des miches de pain ou des produits.

25 2. Dispositif selon la revendication 1, **caractérisé en ce que** lesdits couteaux (5', 5) de fabrication rigide sont fixés
de manière rigide dans lesdits cadres d'appui (6, 7) à une extrémité et à l'autre extrémité oscillent dans une cons-
truction de guidage rainuré (11), dans lequel les deux extrémités des couteaux étant conçues pour pouvoir être
utilisées de manière réversible.

30 3. Dispositif selon les revendications 1 et 2, **caractérisé en ce que** lesdits couteaux (5', 5) sont affûtés d'un côté.

4. Dispositif selon les revendications 1 à 3, **caractérisé en ce que** lesdits couteaux (5', 5) en forme de dents de scie
sont montés dans un premier ou un deuxième cadre d'appui (6, 7), les cadres d'appui étant commandés de telle
35 manière qu'ils se déplacent mutuellement de manière à osciller l'un par rapport à l'autre.

5. Dispositif selon les revendications 1 à 4, **caractérisé en ce que** les couteaux (5', 5) montés sont aiguisés par paires
dans une couche en se faisant face.

40 6. Dispositif selon les revendications 4 et 5, **caractérisé en ce que** chaque paire de couteaux qui fait une entaille à
ce moment est aiguisée à l'endroit où ils se font face et à chaque fois que le couteau particulier est monté dans le
premier ou le deuxième cadre d'appui (6, 7) et décrit par conséquent un mouvement d'oscillation réciproque par
rapport à l'autre.

45 7. Dispositif selon la revendication 6, **caractérisé en ce que** lesdits couteaux (5', 5) sont en forme de scie en molette,
en dent de scie, lisse ou autre.

8. Dispositif selon la revendication 7, **caractérisé en ce que** lesdits couteaux (5', 5) en coupe transversale ont une
lame dont l'épaisseur est comprise entre 0,6 et 3 mm, une largeur comprise entre 5 et 15 mm et ont une longueur
de couteau approximative de 300 mm.

50 9. Dispositif selon la revendication 8, **caractérisé en ce que** le matériau des couteaux est l'acier à lames ou l'acier
au téflon.

55 10. Dispositif selon la revendication 6, **caractérisé en ce que** la commande du premier et du deuxième cadre d'appui
(6, 7) est réalisée par un disque équilibré muni d'une tige excentrique (21) reliée à mécanisme excentrique (8).

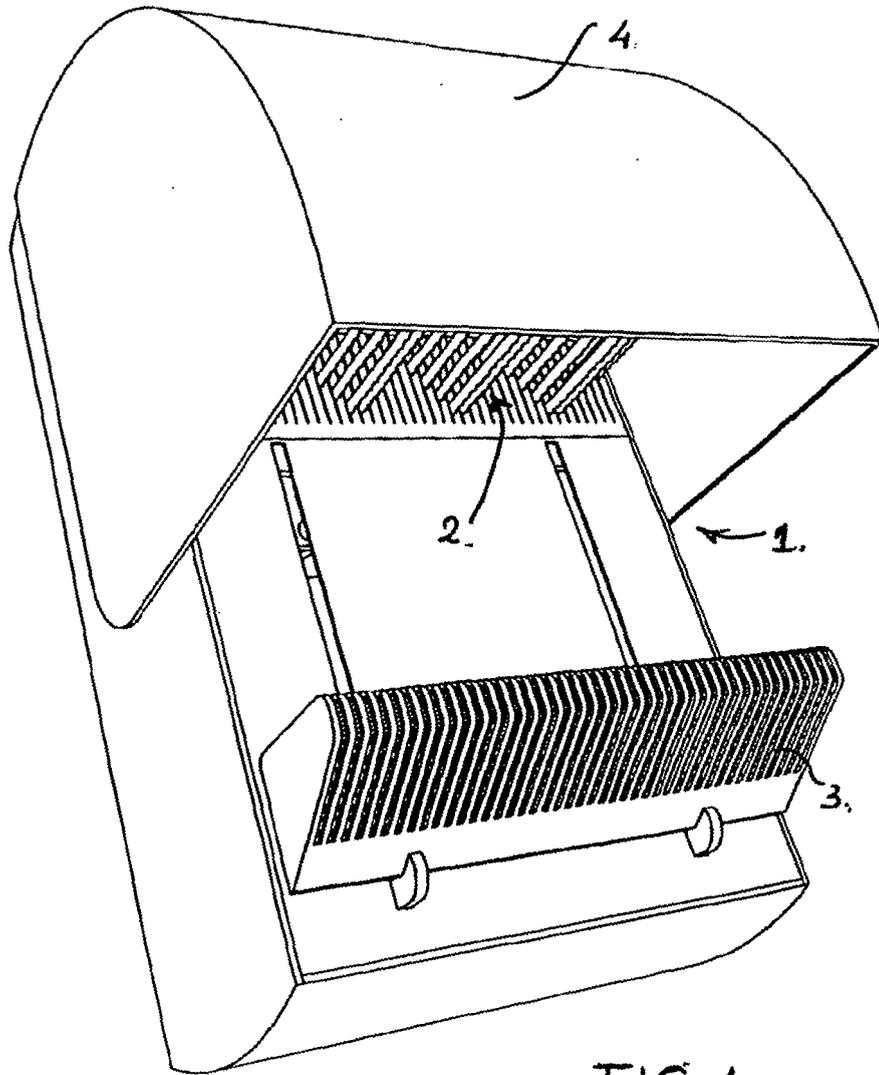


FIG. 1.

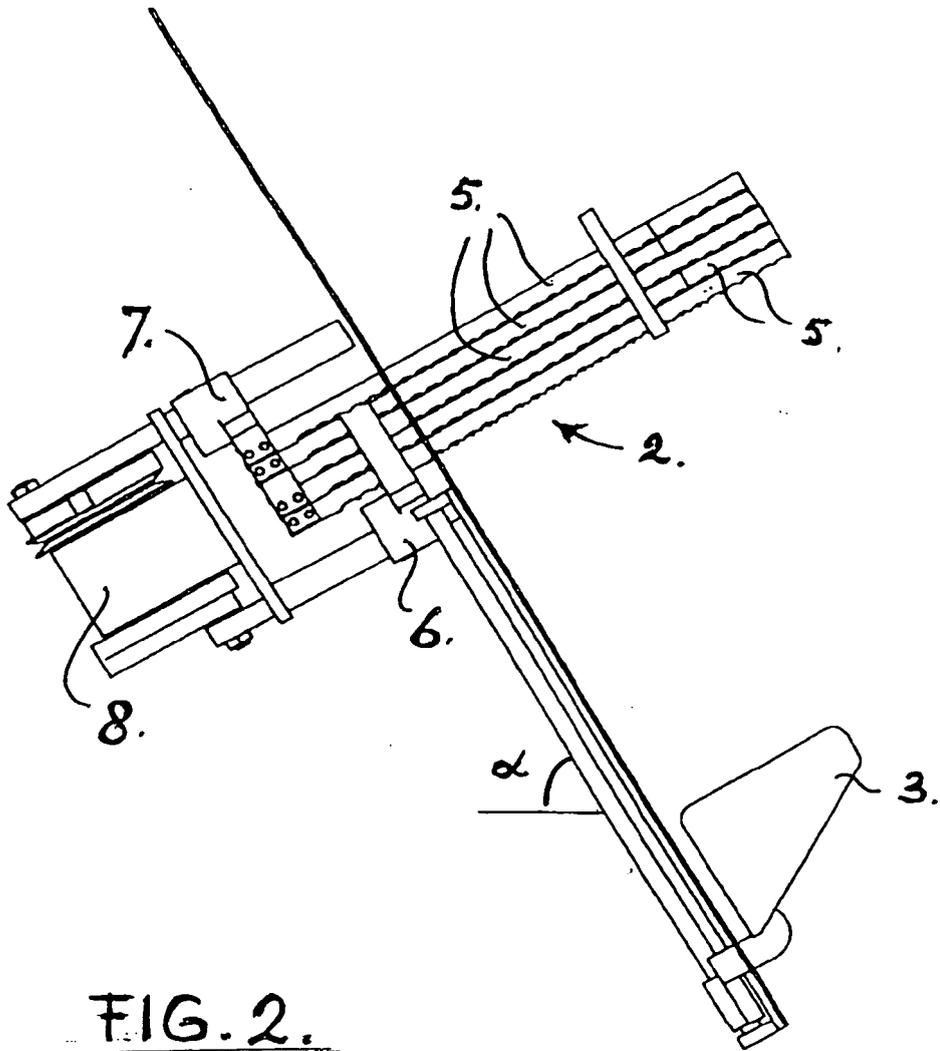


FIG. 2.

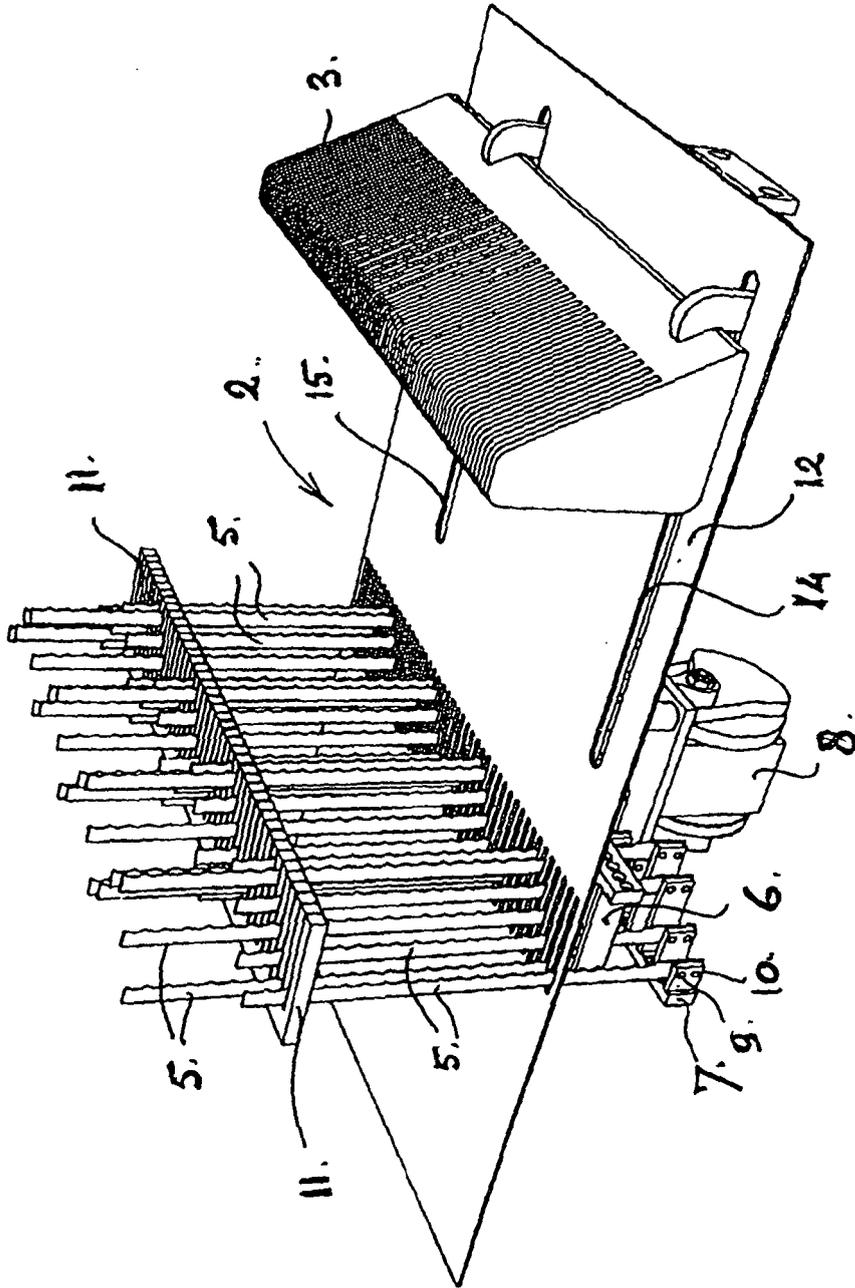


FIG. 3.

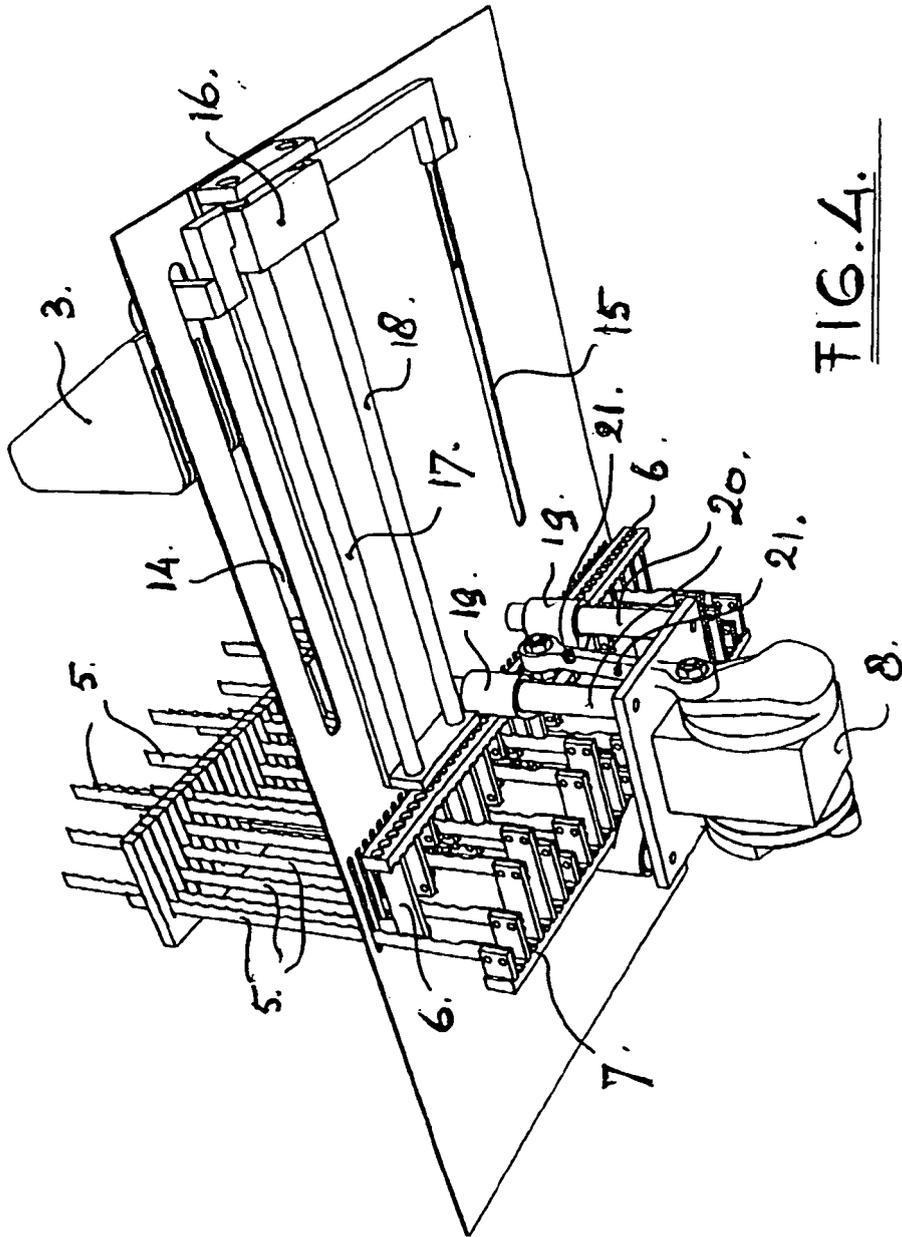
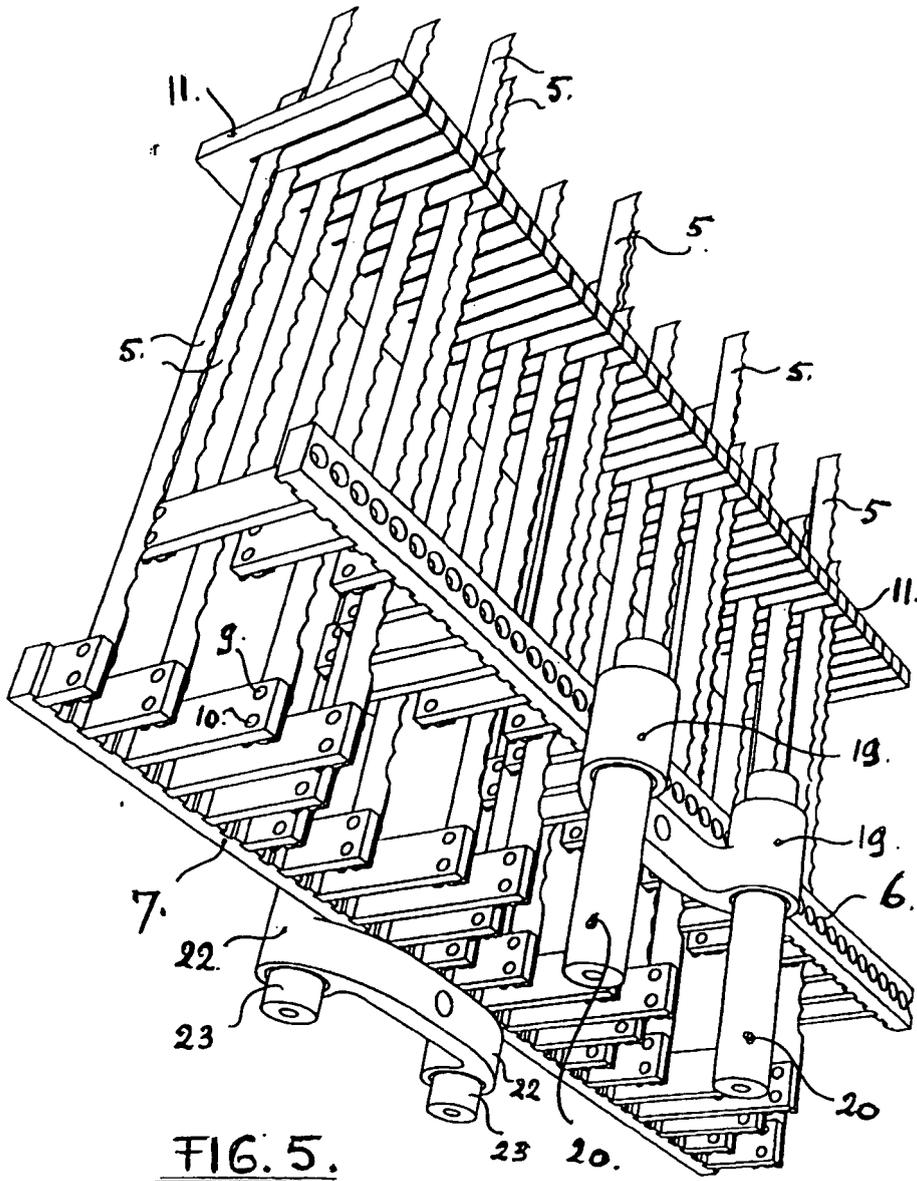


FIG. 4.



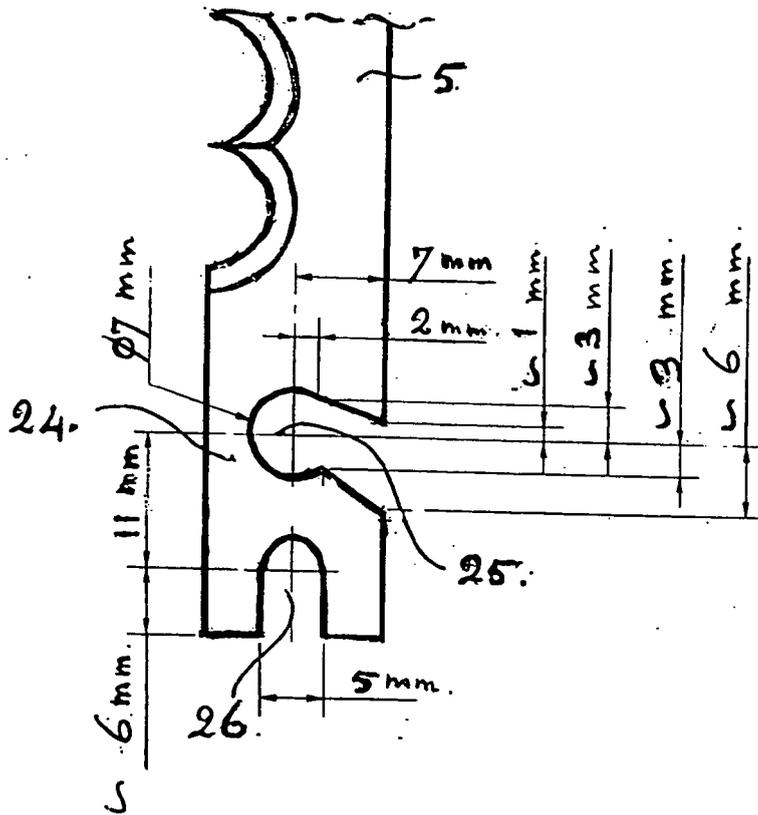


FIG. 6A.

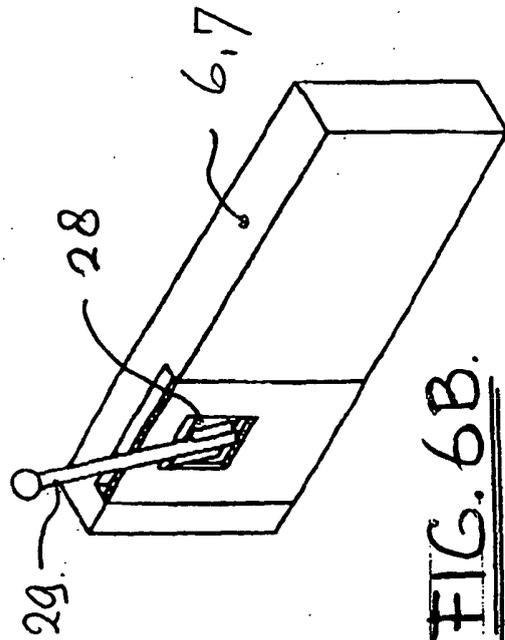
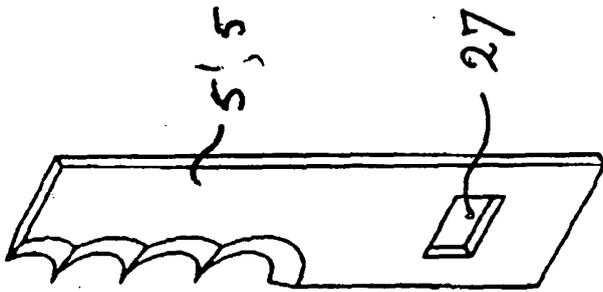


FIG. 6B.

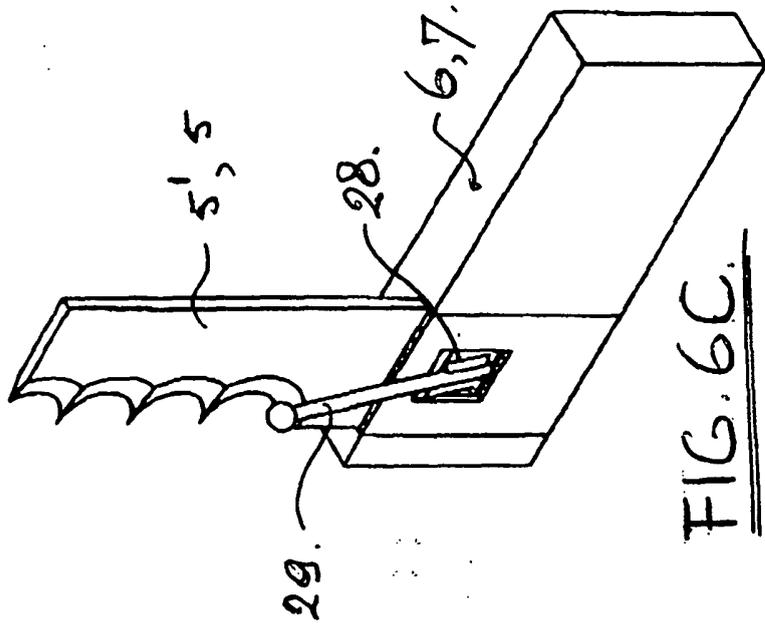


FIG. 6C.

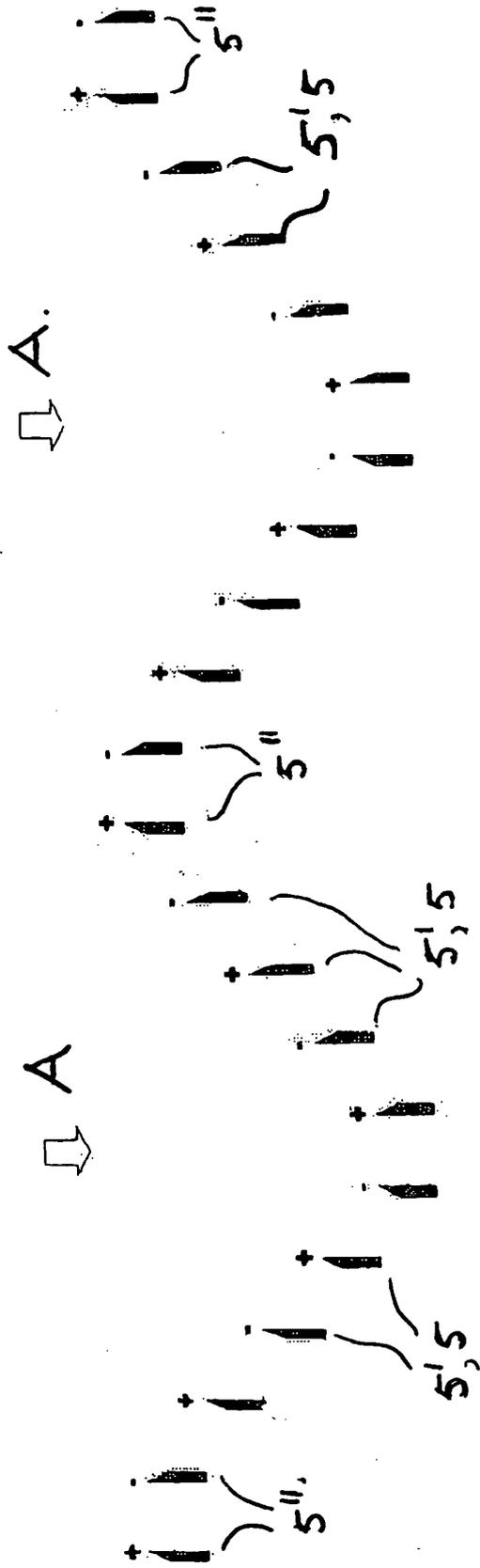


FIG. 7.