

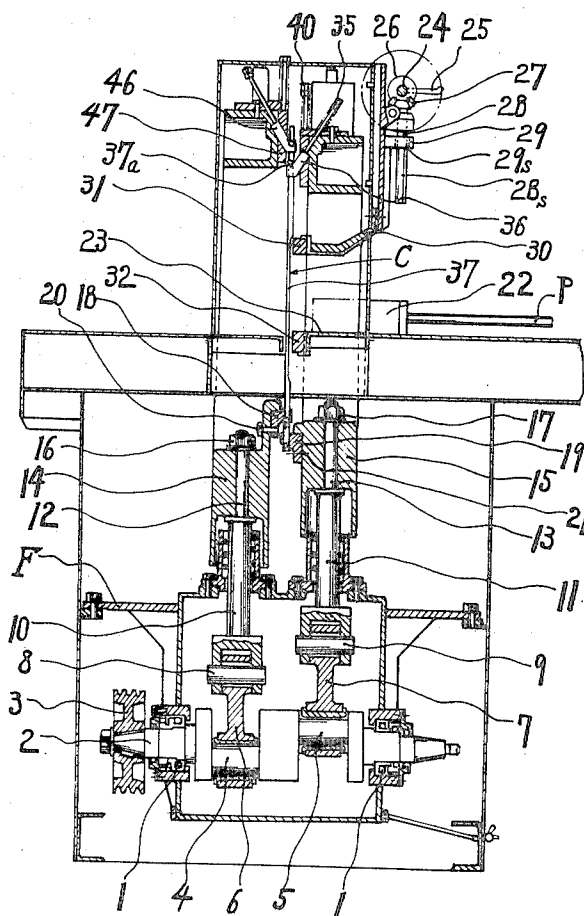
[72] Inventor **Katsushi Takahashi**
 No. 1,021, Miyato, Asaka-shi, Saltama-
 prefecture, Japan
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 [33] **Japan**
 [31] **43/93446**

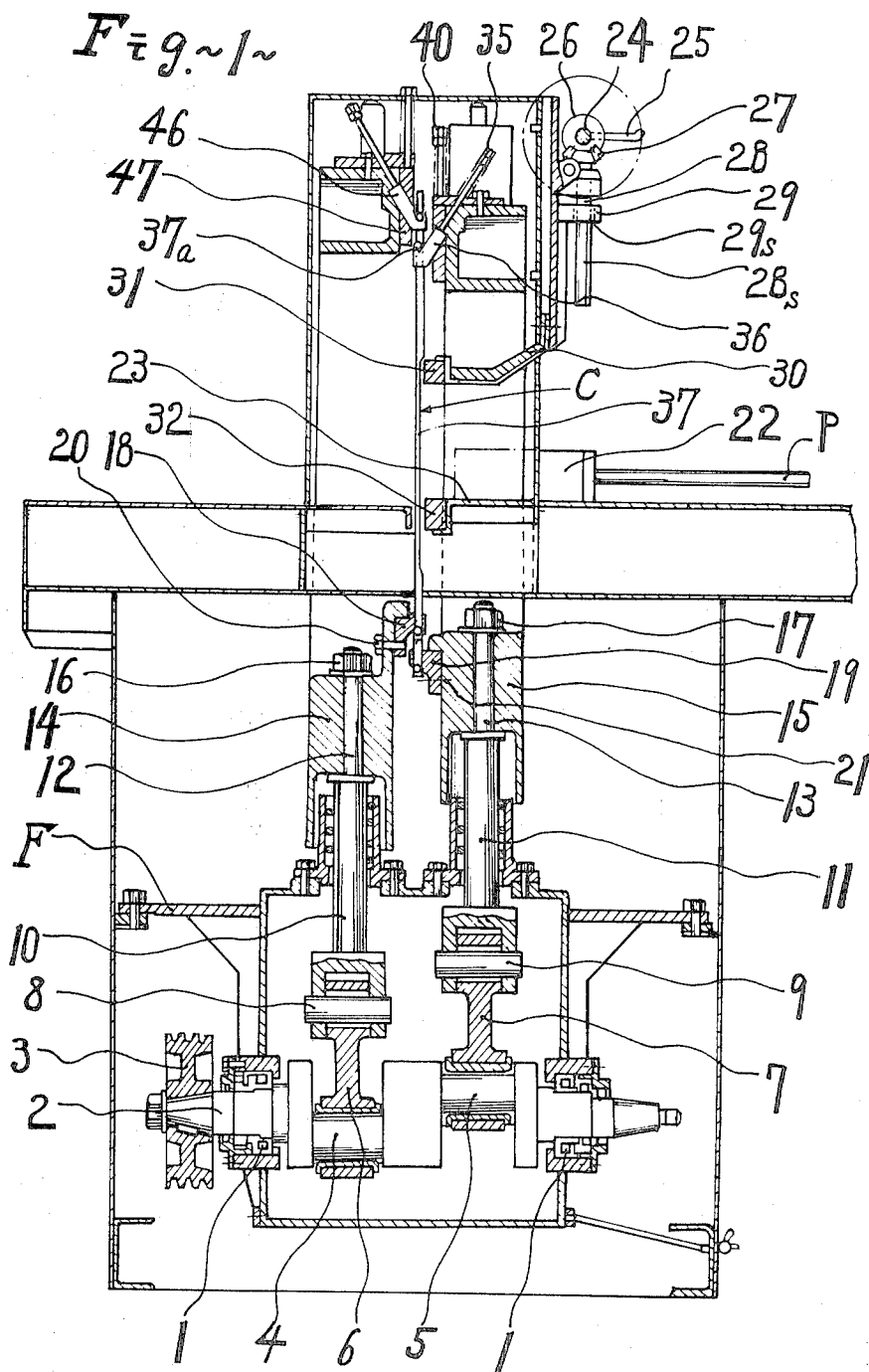
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Primary Examiner—Andrew R. Juhasz
Assistant Examiner—Z. R. Bilinsky
Attorney—Stevens, Davis, Miller & Mosher

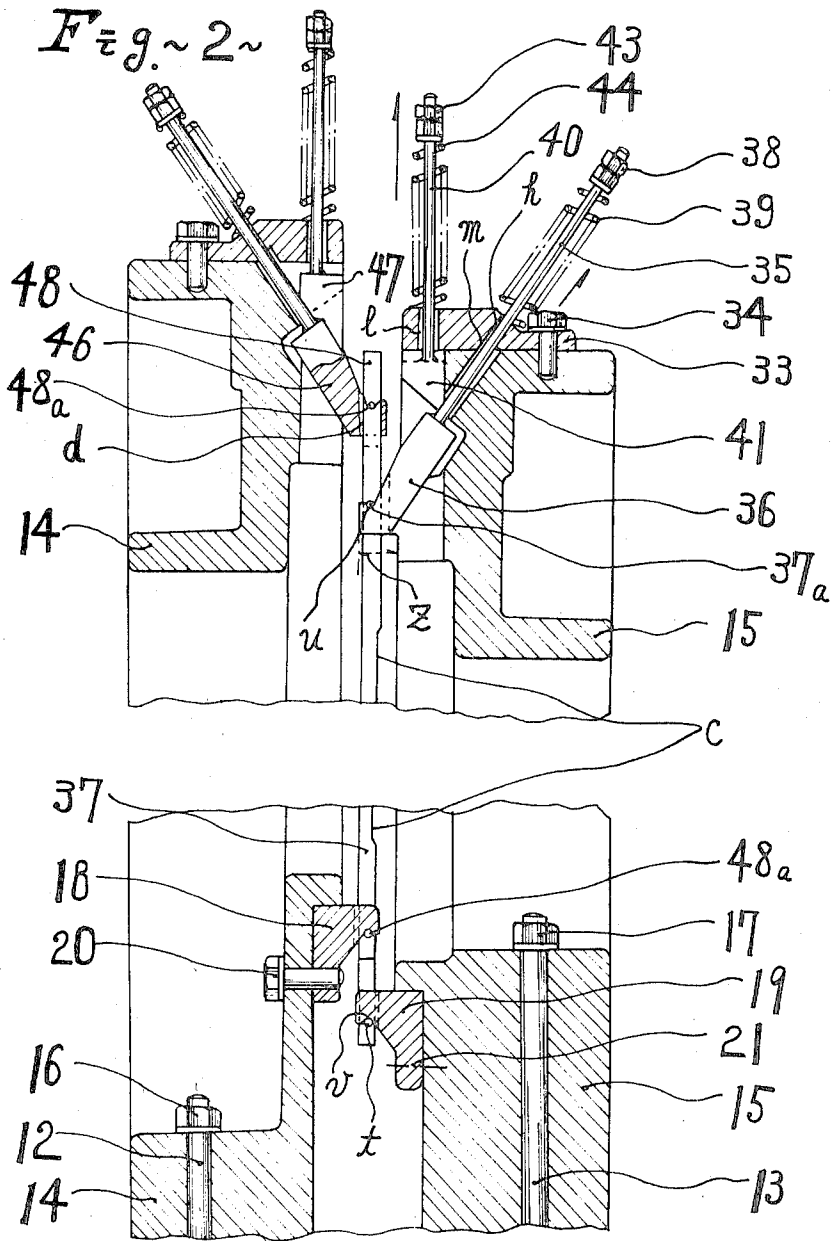
[54] **SLICER**
2 Claims; 4 Drawing Figs.

[52] U.S. Cl. 146/153,
 146/158
 [51] Int. Cl. B26d 4/02
 [50] Field of Search 146/153,
 158, 154, 155

ABSTRACT: A slicer having two groups of knife blades, each group formed by a plurality of blades, secured side-by-side in two pairs of blade holders. Each pair of blade holders secures one group of knife blades and is provided with a groove between each blade of the supported group through which a blade of the other group of blades passes to define a very narrow opening between adjacent blades. The groups of blades are reciprocated in opposite directions to perform the slicing.

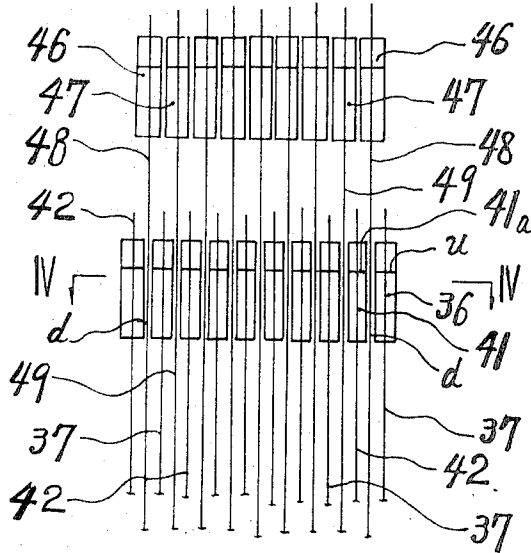
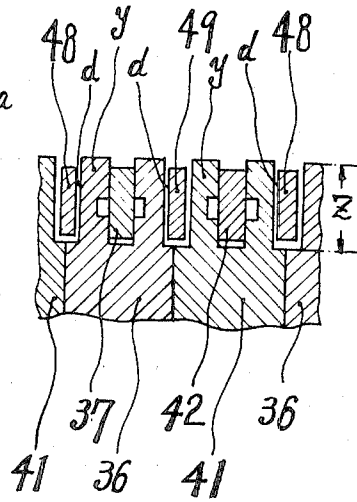
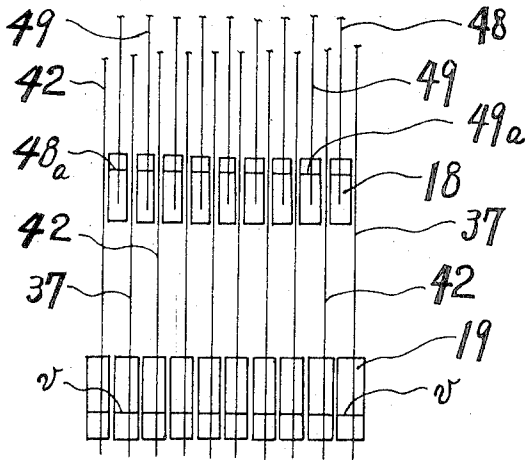






$F' \sim 9 \sim 3 \sim$

$F' \sim 9 \sim 4 \sim$



DESCRIPTION OF THE PRIOR ART

In the prior art slicers for slicing elongated food stuff, such as ham, bacon, cheese and bread into very thin slices, it has been very difficult to slice such foodstuff into very thin slices since the holding members for supporting knife blades on one side are located side by side adjacent to holding members for supporting the knife blades on the opposite side. This causes the spacing between two knife blades disposed side by side to be determined necessarily by a thickness of the respective holding member thus rendering it very difficult to reduce the spacing to the desired value. It may be conceivable to make holding members each having a thickness as small as possible so as to reduce the spacing between knife blades as desired. However, holding members of very small thickness cannot support and secure the knife blades positively and hence may result in undue vibration of the knife blades thereby rendering it difficult to slice the foodstuff into slices of uniform and desired thickness.

SUMMARY OF THE INVENTION

The present invention relates to a slicer, more particularly to a slicer for slicing foodstuff, such as ham, bacon, cheese and bread, into very thin slices.

The principal object of the present invention is to provide a slicer having two groups of knife blades, one group of which is actuated in one direction and disposed alternately with the other group of knife blades actuated in the opposite direction so as to have a spacing between two blades of different groups reduced to very small value.

Another object of the present invention is to provide a slicer having one group of knife blades reciprocated within grooves defined between respective holding members for knife blades of the other group. The other group is adapted to be reciprocated in a sense oppositely to reciprocation of said one group of knife blades.

Still another object of the present invention is to provide a slicer in which the knife blades can be easily replaced.

According to the present invention, there is provided a slicer for slicing foodstuff, such as ham, bacon, cheese and bread, into very thin slices by causing one group of knife blades supported side by side on respective holding members to be reciprocated within grooves defined between holding members having the other group of knife blades supported side by side thereon.

One preferable embodiment of the present invention will be described in detail hereinafter by way of example with reference to the accompanying drawings, in which:

FIG. 1 is a vertical sectional view showing the general arrangement of the slicer according to the present invention;

FIG. 2 is a vertical sectional view in enlarged scale showing the support members for the knife blades in detail;

FIG. 3 is a front view showing the arrangement of knife blades and the support members; and

FIG. 4 is a sectional view in enlarged scale taken along line IV—IV in FIG. 3.

Now referring to FIG. 1, a crank shaft 2 is rotatably supported on bearings 1 mounted on a lower part of frame F. A driving wheel 3 having belts (not shown) passing thereover is mounted on the crankshaft 2 at the left end thereof. A pair of connecting rods 5 and 7 have their lower ends rotatably fitted over the crank pins 4 and 5 respectively, formed integrally with the crank shaft 2. The pair of connecting rods 6 and 7 have their upper ends connected to lower ends of reciprocating rods 10 and 11, respectively, by means of pivot pins 8 and 9. The reciprocating rods 10 and 11 are connected to holding members 14 and 15, respectively, by inserting reduced portions 12 and 13 of the reciprocating rods 10 and 11 into bores of the holding members 14 and 15 and clamping the upper ends of the reciprocating rods 10 and 11 by nuts 16 and 17. Support members 18 and 19 are secured respectively to the upper ends of holding members 14 and 15 by means of bolts

20 and 21. A guide table 23 is adjustably mounted across the holding members 14 and 15 and is centered over the latter. Foodstuff 22, such as ham, bacon, cheese and bread, is mounted on the guide table 23 and moved to the left, with reference to FIG. 1, by means of a pusher P, which is movable horizontally along upper surface of the guide table 23, and will be sliced by means of the numerous knife blades which are reciprocated vertically as described in detail hereafter. The pusher P may be moved manually or mechanically by means of a suitable link mechanism (not shown) at a predetermined height above the guide table 23. A shaft 24 is provided on one end with a crank lever 25 and with a bevel gear 26 on the other end. Another bevel gear 27, meshing with the above-mentioned bevel gear 26, is fixedly mounted on a screw rod 28. A horizontal arm 29, threadedly engaging threads 28, on the screw rod 28, is mounted on one side of a carrier member 30 (to right in FIG. 1) which is moved vertically toward and away from the frame F. A guide member 31 is fixedly mounted on the other side of the carrier member 30 (the left side in FIG. 1) and another guide member 32 is fixedly mounted on the guide table 23 so as to cooperate with the guide member 31 thereby maintaining all the knife blades in a straight condition.

Referring to FIGS. 2, 3 and 4, a number of the support members for securing the knife blades on the holding members 14 and 15 are shown. Since the manner in which the knife blades are secured on various holding members is similar throughout the device, only the holding member 15 will be described for the purpose of convenience. A connector 33 having a slot *m* is secured to the holding member 15 by means of a clamping member 34 such as a bolt (FIG. 2). A hook member 36 is welded to one end of a supporting rod 35, the other end of which is inserted into the above-mentioned slot *m* and a diagonal opening *h* communicating therewith. The hook member 36 is provided at the free end thereof with a recess *u* in which a pin 37_u, provided on one end of the knife blade 37 (the upper end in FIG. 2) will engage, while another pin *t* provided on the other end of knife blade 37 (the lower end in FIG. 2) engages in a recess *v* in the support member 19. The supporting rod 35 is provided at its other end with a stopper nut 38. A resilient member 39, such as a coil spring, is inserted between the stopper nut 38 and the connector 33. The knife blade 37 is urged upwardly in a straight line at all times by means of the resilient member 39 which acts in the direction indicated by the arrow.

Another supporting rod 40 is inserted into an opening *l* which is provided on the connector 33 separately from the above-mentioned opening *h*. Another hook member 41 is welded to the lower end of supporting rod 40. A recess 41_u (FIG. 3) is formed on the hook member 41 at the same elevation as that of the recess *u* of the hook member 36. A knife blade 42 of the same construction as that of the knife blade 37 is connected to the hook member 41 by means of a pin (not shown) engaging with the recess 41_u. A resilient member 44, such as a coil spring, is inserted between a stopper nut 43 at the upper end of the supporting rod 40 and the connector 33. The knife blade 42 will be urged upwardly in a straight line at all times by means of the resilient member 44 which acts in the direction shown by the arrow. The hook members 36 and 41 are mutually disposed side by side with a small groove provided therebetween and with their recess on the hooked ends (upper ends in FIG. 3) maintained at the same level. The knife blades 48 and 49 are secured to the holding member by hook members 46 and 47 in a similar manner and need not be described further.

The elevation at which hook members 46 and 47 are mounted on the holding member 14 is made different from that at which the hook members 36 and 41 are mounted on the holding member 15, as shown in FIG. 3, by making the elevation at which the holding member 14 is connected to the reciprocating rod 10 different from that at which the holding member 15 is connected to the reciprocating rod 11, as shown in FIG. 1. Pins 48_u and 49_u, provided on the upper ends of the

knife blades 48 and 49, are engaged with a recess (not shown) on the hook members 46 and 47, respectively.

As shown in FIG. 4, recesses having a depth of z are provided on both sides of each of the hook members 36 and 41 to form a series of grooves d along a contact surface of two-adjoining hook members at blade-supporting portions y . Each of the knife blades 48 and 49 is disposed to pass through the above-mentioned grooves d . Cutting edges c of the knife blades 37 and 42 are directed to the right, with reference to FIG. 1, so as to slice foodstuff, such as ham, bacon, cheese and bread, placed in the right side and moved toward the knife blades by pusher P. A prime mover for driving the crank shaft 2 and a conveyor means for transferring sliced foodstuff can be provided in addition to the above-mentioned members. However, since they have no bearing on the merit of the present invention directly, no further description will be given.

In operation, a lump of foodstuff 22 is placed on the guide table 23 and will be pushed forward to the cutting edges C of the knife blades, extending vertically side by side by means of a pusher P, which is moved to the left with reference to FIG. 1, and the foodstuff is held against vertical motion between the guide members 31 and 32. The prime mover drives the crank shaft 2 through driving wheel 3. Accordingly, the holding members 14, 15 are reciprocated simultaneously and in opposite directions to each other by action of the connecting rods 6 and 7 and the reciprocating rods 10 and 11, while being maintained in parallel side by side condition, thereby causing one group of knife blades 37 and 42 and another group of knife blades 48 and 49 mounted side by side on the holding members 14 and 15, respectively, to be reciprocated simultaneously but in opposite directions. When the foodstuff 22 is progressively pushed along the table 23 by means of the pusher P, to the left with reference to FIG. 1, it will be sliced instantaneously by means of the groups of knife blades 37, 42 and 48, 49 reciprocating in opposite directions to each other. At this time, since the foodstuff 22 is held between the guide members 31 and 32 and prevented from being moved vertically, it will be sliced easily and rapidly into slices of uniform thickness by means of the cutting edges C. The sliced foodstuff will have a uniform appearance. Furthermore, the slicer according to the present invention will have a spacing between two adjoining knife blades much smaller than that of the conventional slicer. Therefore, the foodstuff may be sliced into slices of very small and uniform thickness by means of the present slicer, whereas it was not possible to make slices of thickness less than a certain value in the known conventional

slicers.

In addition, there will be no need of making a blade supporting portion heavy despite the very small spacing between adjoining knife blades. A number of grooves are formed between supporting members supporting the knife blades moving in one direction so as to accommodate the knife blades moving in opposite directions. Thus, the construction of the slicer according to the present invention is not complicated, and the same construction may be applied to each holding member thereby rendering the assembly very simple and fast.

In case of breaking of some of the knife blades, they may be replaced very easily by releasing and engaging a few pins on the knife blades which are adapted to be engaged with recesses of the hook members or supporting members.

I claim:

1. A slicer for making a plurality of uniform, thin slices in a single operation comprising, a frame, first and second holding members mounted for opposing, reciprocal, motion in said frame, each said holding member having substantially parallel, spaced upper and lower portions, first and second groups of knife blades, each group being formed by a plurality of individual knife blades, means to mount said first and second groups of knife blades in said first and second holding members, respectively, and comprising support members fixedly mounted on said lower portion and hook means adjustably mounted on said upper portion, said hook means being mounted in an alternating manner normal to and diagonal to said knife blades, a plurality of grooves formed in said upper and lower portions of each of said holding members between each of the knife blades mounted therein, said holding members being mounted in said frame at different elevations but in substantially the same vertical plane with the knife blades of one group passing through the grooves in the opposite holding member so as to be parallel to and closely spaced from the knife blades of the other groups of knife blades, and means to reciprocate said holding means in opposing directions.

2. A slicer according to claim 1 further comprising a plurality of alternating diagonal and normal openings formed in said upper portion of each of said holding members, each said hook means comprising a supporting rod, hook member fixed to one end of said rod and adjusting means connected to the other end of said rod, said rods being mounted to pass through said openings, and resilient means mounted to act on said supporting rod whereby the knife blade attached thereto is kept under constant tension.

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