July 31, 1934. W. A. VAN BERKEL 1,968,662

SHARPENING APPARATUS

Filed March 12, 1930

Fig. 1

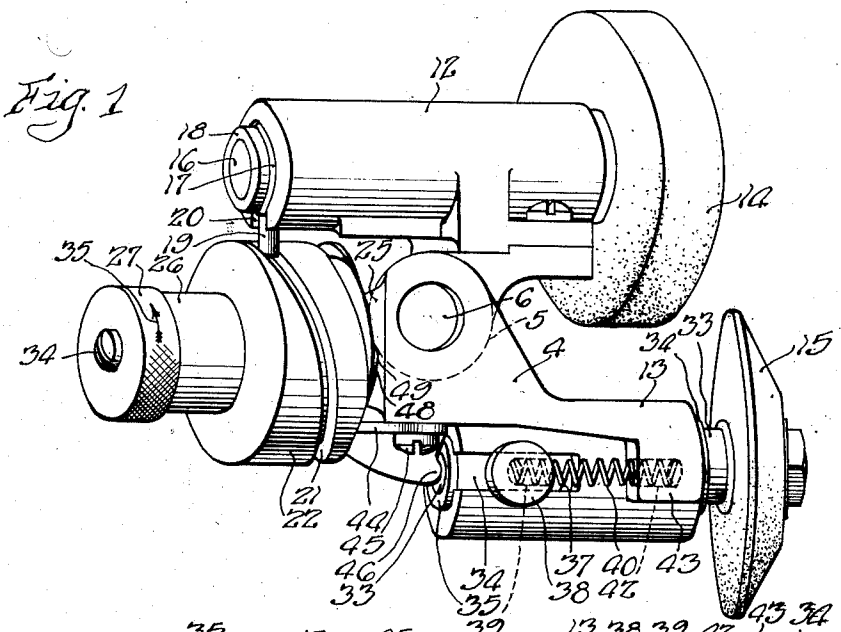


Fig. 2

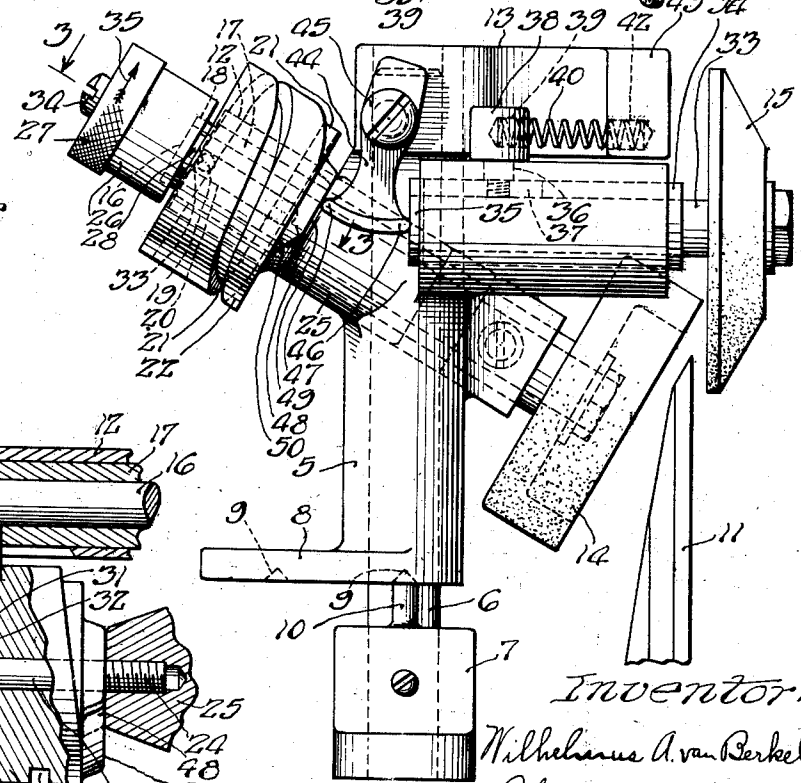
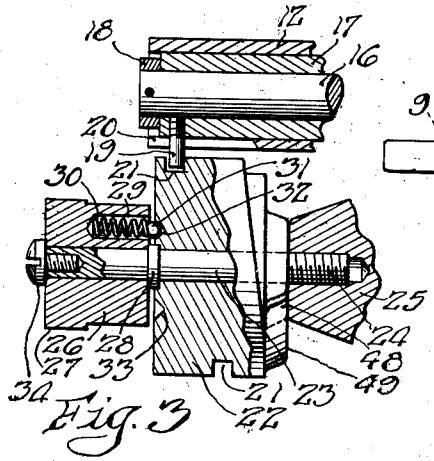


Fig. 3



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1,968,662

SHARPENING APPARATUS

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Application March 12, 1930, Serial No. 435,117
In Germany April 3, 1929

19 Claims. (Cl. 51—248)

The use of the open-ended cam slots in the rotary cams shown in this application as a means of assisting in the release of a sharpening element otherwise releasable by manual pressure from its bearing, is claimed in my copending application, Serial Number 495,339, filed November 13, 1930.

My invention relates to sharpening apparatus for rotary circular knives of meat slicing machines and the like, and one of the objects of the invention is the provision of improved and efficient means for controlling the application of the grinding elements to the knife to be sharpened and limiting the pressure on the knife.

Another object of the invention is the provision of improved and efficient means for very gradually applying a grinding tool to the knife to be sharpened so as to more accurately position such tool in its operative position.

A further object of the invention is the provision of means for adjusting the position of a grinding tool, combined with means for preventing the grinding tool from exerting more than a predetermined pressure on the knife to be sharpened.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the accompanying drawing—

Fig. 1 is a perspective view from the top of the sharpening apparatus embodying my invention;

Fig. 2 is a side elevation of the structure shown in Fig. 1; and

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2.

The supporting frame 4 for the sharpening mechanism comprises a tubular portion 5 which is adapted to slide vertically on the post 6, the latter being secured to the support 7 on the frame of the meat slicing machine. A sector plate 8 is provided with conical recesses 9, 9 for receiving the upper conical end of the pin 10 on the support 7. By lifting the frame 4 the sharpening mechanism may be moved vertically from the rotary circular slicing machine knife 11 so as to clear the same while the frame 4 is rotated on the post 6 until the pin 10 engages the left-hand recess 9.

To the supporting frame 4 is rigidly connected the tubular extensions 12 and 13 which serve to support the primary or sharpening grinding wheel 14 and the secondary or burr removing grinding wheel 15. The grinding wheel 14 is secured to a spindle 16 slidable longitudinally in the cylindrical bearing 17 as shown in Fig. 3. A retaining collar 18 is secured to that end of the spindle 16 remote from the grinding wheel 14.

The collar 18 retains the spindle 16 in the cylindrical bearing 17 against longitudinal movement relatively thereto, although the grinding wheel 14 and the spindle 16 may rotate in the bearing 17.

A pin 19 is secured to the cylindrical bearing 17 and projects radially through a slot 20 in the tubular extension 12. The outer end of the pin 19 projects into the helical groove 21 on the cylindrical surface of the drum 22.

A bolt 23 is screw threaded at 24 into the bracket 25 which is secured rigidly to the frame 4. The bolt 23 serves as a bearing for the drum 22 as shown in Fig. 3. It should be understood that the drum 22 is journaled on the bolt 23 so as to rotate freely thereon.

A knob 26 knurled at 27 is mounted on the outer end of the bolt 23 for free rotation thereon. A collar 28 may intervene between the journal bearings for the drum 22 and knob 26 respectively.

The knob 26 is provided with a cylindrical socket 29 for receiving a pressure spring 30 which urges a locking element 31 into any one of a plurality of conical recesses 32, 33 which are located in the upper flat face of the drum 22 beneath the knob 26.

The knob 26 may be detachably connected to the bolt 23 by means of the cap screw 34. When the cap screw is in place as shown in Fig. 3, the knurled surface 27 may be grasped manually so as to turn the knob 26 in the direction of the arrow 35 shown in Fig. 1, whereupon the element 31 with the spring 30 pressing the same into the recess 32 will act to transmit rotary movement to the drum 22. The helical or spiral cam slot or groove 21 will be moved in such a direction as to shift the pin 19 along the slot 20 toward the knife 11. Anti-clockwise movement of the drum 22 will therefore effect a positive movement of the sharpening grinding wheel 14 toward the knife 11 and into engagement therewith.

The pitch of the spiral cam slot or groove 21 is preferably such as to effect a locking of the grinding wheel 14 in operative position in engagement with the knife 11. If movement of the drum 22 were permitted to such an extent that too great a pressure is exerted by the grinding wheel 14 on the knife 11 and the wheel 14 is locked in operative position, the rotation of the knife 11 can be effected only with difficulty

with the result that the grinding tool may not accompany the knife in its rotation.

On account of irregularities in the beveled edge of the knife to be sharpened, the pressure of the grinding wheel 14 on the knife edge at certain portions thereof may be such as to injure or ruin the grinding element or the knife, or both. In order to overcome this disadvantage, I prefer to guide the grinding element 14 very gradually toward the knife by means of the long spiral cam slot 21 which effects small increments of approach of the grinding element 14 toward the knife.

Furthermore, the pressure which can be exerted by the grinding element 14 on the knife will be limited to a safe pressure by reason of the slipping of the element 31 out of the recess 32. That is to say, by reason of the slipping of the clutch 31, the mechanism for moving the grinding element 14 into engagement with the knife 11 becomes inoperative when a certain predetermined pressure of engagement between the grinding element 14 and the knife 11 has been attained.

The burr removing grinder 15 is mounted on the spindle 33 which is journaled in the sleeve bearing 34 and prevented from moving longitudinally relatively thereto by the retaining collar 35 which is similar to the collar 18 on the spindle 16. A pin 36 is secured to the sleeve bearing 34 and projects through a slot 37 in the tubular extension 13 as shown in Figs. 1 and 2. Secured to the pin 36 is a block 38 having therein a recess 39 for receiving one end of the spring 40, the other end of which extends into a recess 42 in the block 43 on the tubular extension 13. It will thus be seen that the spring 40 acts to constantly urge the burr removing grinder 15 toward the rear edge of the rotary slicing machine knife 11.

A lever 44 is pivoted to the pin 45 in position to cause the nose 46 to bear against the rear end of the spindle 33.

The other nose 47 on the lever 44 is in position to engage the cam 48 which is located on the lower inclined face of the drum 22. The cam 48 is provided with a flat face 49 in a plane at right angles to the axis of rotation of the drum 22 so that during a portion of the rotation of the drum 22 in an anti-clockwise direction from the position shown in Fig. 2, the noses 46 and 47 will remain in the positions shown in Fig. 2. The inclined face 50, however, extends toward the lower face of the drum 22 so that upon continued rotation of the drum 22 in an anti-clockwise direction the spring 40 will be able to move the sleeve 34 to the left and with it the spindle 33. That is to say, when the drum 22 is turned in an anti-clockwise direction through a predetermined angle, the nose 47 will ride upwardly along the cam surface 50, being urged to do so by the spring 40 through the bearing sleeve 34, the spindle 33, nose 46 and lever 44.

From the foregoing it will be seen that upon grasping the knob 27, rotation of the drum 22 may be effected in an anti-clockwise direction through the clutch 31, whereupon the comparatively long spiral groove 21 will effect gradual movement of the sharpening grinding wheel 14 into engagement with the beveled edge of the rotary slicing machine knife 11. The movement of the grinding wheel 14 into engagement with the knife 11 is positive, but the pressure may be regulated with exactness because of the small increments which may be effected by means of the short pitch of the helical groove 21. Furthermore, the pressure which may be thus positively exerted will be limited by the slipping of the clutch 31 when a predetermined pressure is exceeded.

The arrangement may be such that the sharpening grinding wheel 14 may be moved into engagement with the beveled edge of the knife 11 before the cam 48 is moved sufficiently to permit the burr removing grinder to move into engagement with the opposite edge of the knife. However, the burr removing grinder is permitted by the cam surface 50 to engage the knife before the maximum predetermined pressure is exerted by the grinding wheel 14 on the knife. It will also be seen that by reason of the clutch 31 the knob 27 may be moved quickly in an anti-clockwise direction to effect movement of both of the grinding wheels into engagement with the knife when desired, without any risk of too great a pressure being exerted by the grinding wheel 14 on the knife.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended and I wish therefore not to be restricted to the precise construction herein disclosed.

Having thus fully disclosed an embodiment of my invention, what I desire to secure by Letters Patent of the United States is:

1. Sharpening apparatus comprising a grinding element, a spindle therefor, a supporting frame, a slidable sleeve mounted in said frame and serving as a journal bearing for said spindle, a cam, a lever pivoted to said frame in position to engage the rear end of said spindle and the face of said cam, and means for actuating said cam to effect adjustment of the position of said grinding element.

2. Sharpening apparatus comprising a grinding element, a spindle therefor, a slidable sleeve serving as a journal bearing for said spindle, means comprising a spring for moving the sleeve longitudinally to move the grinding element into engagement with the knife, a rotary cam, and a pivoted lever having two noses one engaging the rear end of said spindle and sleeve and the other engaging the face of said cam to effect movement of the grinding element out of engagement with the knife when said sleeve is moved against the action of said spring.

3. Sharpening apparatus comprising a sharpening grinding element, a spindle therefor, a burr-removing grinding element, another spindle for the last-named element, means comprising a low pitch helical cam for positioning the sharpening grinding element, an additional cam, means comprising a movable member mounted between said additional cam and the spindle of the sharpening grinding element and having contact with the end of said spindle substantially at a point co-axial with the axis thereof for positioning the latter, and a single device for operating both of said cams.

4. A sharpening apparatus for slicing machine knives comprising a grinding device, a support for said grinding device, means for moving said grinding device into operative position in engagement with the knife to be sharpened, and means for limiting the pressure of the grinding device against the knife independently of the position of said grinding device with respect to its support.

5. A sharpening apparatus comprising a support, a grinding element carried by said support, a spring connected to said grinding element to move the same into engagement with a knife, a cam, and means comprising a lever pivoted to said support engaged by said cam and contacting with a portion rigid with said spindle substantially co-axial with the axis of said spindle for controlling the position of said grinding element in a direction away from said knife, a second grinding element, and means for positively moving said second mentioned grinding element to and from its operative position with respect to said knife and for preventing movement of said grinder when said means is at rest by a force applied to said grinder.

6. In a sharpening apparatus for slicing machine knives, the combination with a grinder, a cam, means frictionally engaging said cam and adapted to rotate said cam when said means is rotated, a spindle, a connection between said cam for controlling positively the position of said grinder spindle, and a grinder on said spindle, means for driving said cam being rendered inoperative to move said grinder spindle after said grinder has been moved with a predetermined force against the slicing knife being sharpened.

7. A device as claimed in claim 6 in which said means for frictionally driving said cam comprises a rotatable member, and a friction device interposed between said member and said cam.

8. A sharpening apparatus for slicing machine knives comprising a grinder spindle, a grinder supported on said spindle, a cam for positively moving said spindle longitudinally of its axis, a member for rotating said cam, and a superimposed pawl carried by said member and rotatable therewith, said pawl engaging said cam with a yielding pressure to cause said cam to rotate with said member except when the force necessary to rotate said cam exceeds a predetermined amount.

9. A device as claimed in claim 8 in which said cam is provided with detents adapted to receive said pawl and assist said member in rotating said cam.

10. In a grinding apparatus, the combination with a support, of a main grinder positively moved to and from grinding position and held positively against movement in any position of adjustment, a burr removing grinder, actuating means for moving said burr removing grinder positively into an inoperative position, and means for yieldingly urging said burr removing grinder against the knife being sharpened upon release of said actuating means.

11. In a grinding apparatus, the combination with a support, of a main grinder positively moved to and from grinding position and held positively against movement in any position of adjustment, a burr removing grinder, actuating means for moving said burr removing grinder positively into an inoperative position, and means for yieldingly urging said burr removing grinder against the knife being sharpened upon release of said actuating means, said grinders both being controlled by a single rotatable member having cam surfaces thereon for controlling said grinders in the aforementioned manner.

12. In a grinding apparatus, the combination with a support, of a main grinder, a burr removing element, a rotatable cam having a peripheral helical groove therein, means operatively arranged within said groove and connected to said main grinder for positively controlling the position of said main grinder, a second cam on said rotatable member, and a lever pivoted to a support engaging said cam and operatively connected to said burr removing element to positively move said burr removing element out of operative position, and a spring for urging said burr removing element into operative position.

13. A device as claimed in claim 12 in which a friction control member is used for rotating said rotatable member so as to prevent rotation of said rotatable member when a predetermined force is required to rotate said cam.

14. In a device for sharpening knives of slicing machines, the combination with a sharpening element movable to and from the knife to be sharpened, a control means for moving said sharpening element, and a connection between said control element and said sharpening element operative to release said driving connection between said control element and said sharpening element when the sharpening element engages said knife with a predetermined pressure, whereby the grinding pressure is determined by said automatically releasable driving connection between said control element and said sharpening element.

15. Sharpening apparatus comprising a grinding element, a supporting frame, a grinding element carrying means comprising a spindle and a slidable sleeve mounted in said frame and serving as a journal bearing for said spindle, a cam, a lever pivoted to said frame in position to engage the grinding element carrying means and also the face of said cam, and means for actuating said cam to effect adjustment of the position of said grinding element.

16. Sharpening apparatus for knives of slicing machines, comprising a grinding element, means for setting the grinding element in operative position in engagement with the knife to be sharpened, a device for operating said setting means, and a yielding clutch between said operating device and said setting means.

17. Sharpening apparatus comprising a grinding element, means comprising a rotary cam for moving said grinding element positively into engagement with the knife to be sharpened, and means comprising a friction clutch for rotating said cam until said grinding element exerts a predetermined pressure on said knife.

18. Sharpening apparatus comprising a grinding element, a spring connected to said grinding element and to a support for moving said grinding element into engagement with a knife, a cam, means comprising a pivoted lever engaged by said cam for controlling the position of said grinding element, and a spindle rotatably supporting said grinding element, said pivoted lever engaging said spindle substantially at a point co-axial with the axis of rotation thereof.

19. A sharpener for meat slicing machines, comprising a rotatable grinder, a part movable bodily therewith, and held against longitudinal movement with respect to the axis of said grinding tool, a manually movable cam having a helical groove therein, in which said part is arranged, means for guiding said part longitudinally in a fixed path, the surface of said groove engaging said part at such an angle that longitudinal pressure of said grinder during sharpening of a knife will not induce a sufficient resultant rotative force on said cam to rotate said cam when the latter is released.

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