Aug. 4, 1942. C. W. GOOCH, JR 2,292,269

TOBACCO CUTTING MACHINE

Filed June 5, 1939

FIG. 1.

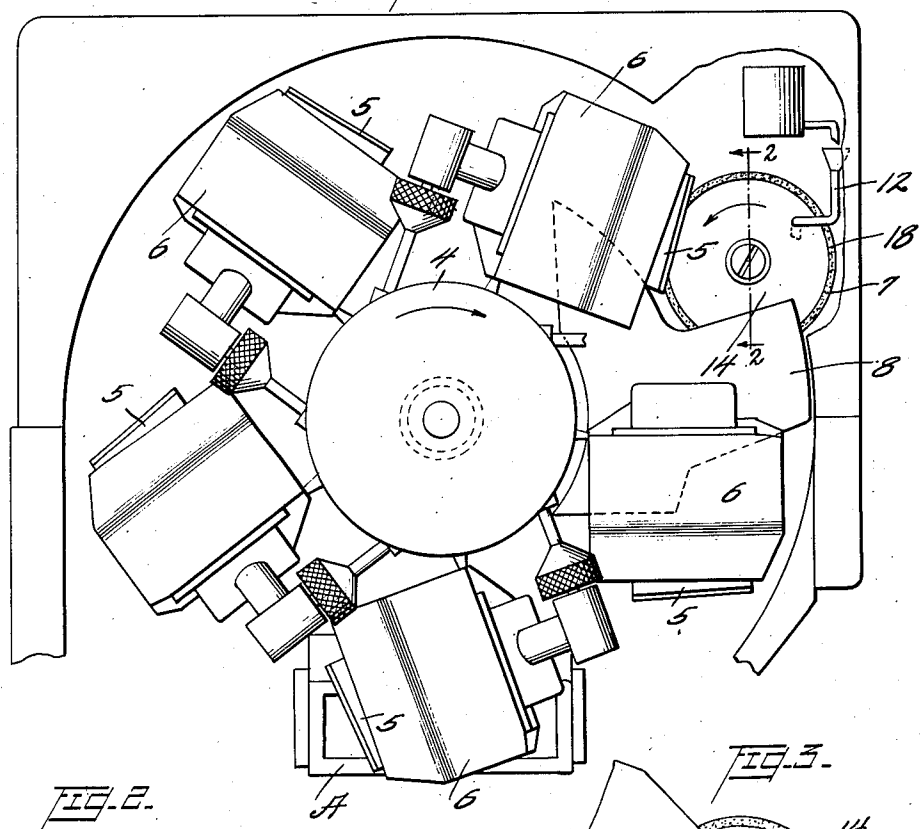


FIG. 2.

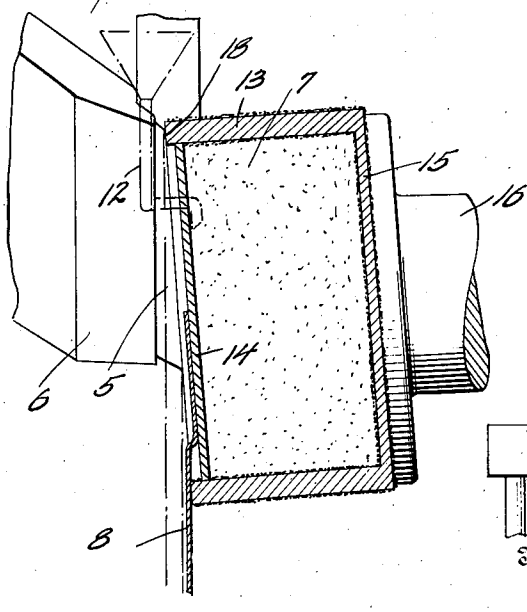


FIG. 3.

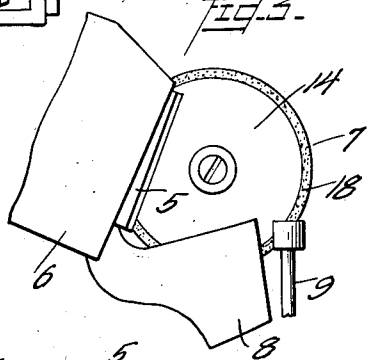
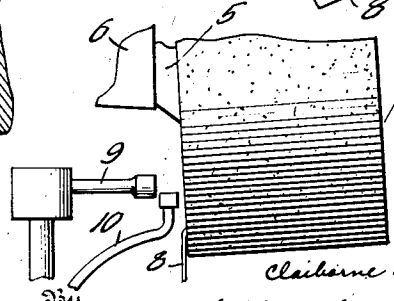


FIG. 4.



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Patented Aug. 4, 1942

2,292,269

UNITED STATES PATENT OFFICE

2,292,269

TOBACCO CUTTING MACHINE

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Application June 5, 1939, Serial No. 277,501
In Great Britain July 8, 1938

10 Claims. (Cl. 51—247)

This invention is directed to improvements in or relating to tobacco cutting machines of the rotary type, the present application being a continuation-in-part of my prior application Serial No. 242,097, filed November 23, 1938. Machines of the rotary type are ordinarily provided with a rotating head on which is mounted one or more cutting blades, and it is customary to position a grindstone in proximity to the path of movement of the blades to engage and sharpen the latter. Considerable difficulty has been experienced, however, in the practical use of such an arrangement, since it is found that the juices exuded from the tobacco cause a sticky coating to form on the edge of the cutting blades, and this coating is imparted to the grinding surface and materially interferes with the grinding operation.

It is therefore an important object of the present invention to overcome this difficulty and otherwise to improve the grinding operation. As one step in the desired direction, it is proposed to moisten the grinding surface in order to prevent the loading of this surface with tobacco gum, flavoring, and various other components of the exuded juices. Moisture is preferably supplied in such quantity that it is transmitted to the knife blade, so that the accumulation of gummy substances on the blade is materially reduced or eliminated.

It has further been found difficult in machines heretofore constructed satisfactorily to dispose of the particles of grit and metal discharge from the zone of contact between the blades and the grinding surface. Obviously these particles should be excluded from the shredded tobacco, and should not be allowed to collect on the grinding surface so as to interfere with the efficiency of the grinding operation. This is especially desirable when the grinding surface is moistened as herein proposed in order that the moisture may be freely transmitted to the blades for removal of the gummy substances from the latter.

It is therefore a further object of the invention to ensure the removal of foreign particles and gummy material from the grinding zone and the segregation thereof from the shredded tobacco. In a preferred form of the invention, the desired result is achieved by so disposing the grinding surface with respect to the path of blade movement as to promote free downward discharge of foreign particles, and by providing means adjacent the grinding zone for segregating or collecting these particles.

Further objects and features of the invention will be apparent from the following description taken in connection with the accompanying drawing in which:

Figure 1 is an end elevation of a portion of a tobacco cutting machine illustrating one method of applying the principles of the invention thereto;

Figure 2 is a vertical sectional view of a portion of the structure shown in Figure 1;

Figure 3 is a fragmentary end elevation illustrating a modification of the arrangement shown in Figure 1; and

Figure 4 is a side elevation of the structure shown in Figure 3.

In order to facilitate an understanding of the invention, reference is made to the embodiments thereof illustrated in the accompanying drawing and specific language is employed to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, various further alterations and modifications being contemplated such as would occur to one skilled in the art to which the invention relates.

It is common practice in the preparation of tobacco for use in cigarettes or the like, to employ one or more rotating blades which sweep across a mouthpiece through which a mass or "cheese" of tobacco is progressively forced. This is the type of machine hereinbefore referred to as the rotary machine; one such machine is illustrated, for example, in the prior patent to Molins et al, 1,933,181. The present invention relates to improvements in the sharpening of knives in machines of this general character, the details of the machine forming no part of the invention. Many of these details are accordingly omitted from the accompanying drawing of this application.

Thus, referring to Figure 1, it will be observed that a plurality of cutting knives **5** are shown, each knife being mounted in a suitable holder **6**. The holders are in turn mounted upon a central support **4** which is rotated in the direction of the arrow, whereby the knives **5** are caused to pass in succession across a conventional mouthpiece A for the purpose of cutting or shredding the tobacco cheese. Preferably the knives **5** are so mounted that they are automatically fed forwardly in the holders **6** to compensate for wear, one such feeding arrangement being shown in detail in the prior patent to Molins et al. hereinbefore referred to.

A grinding element 7 is disposed in proximity to the path of rotation of the cutting edges of the knives 5 to engage and sharpen the same; as illustrated in the drawing, this element is of generally annular shape. Thus the grinding element may be cup-shaped in configuration, as shown more fully in Figure 4 of the drawing, to provide a peripheral wall 13, a rear wall 15, by means of which it is mounted on a rotating shaft 16, and a lateral annular grinding surface 18. The supporting shaft for the grinding element is preferably so rotated that the element moves in a counterclockwise direction as shown by the arrow in Figure 1. Furthermore, the element 7 is preferably so positioned that the grinding surface 18 thereof engages and sharpens the knives at a point in the path of movement of the latter where the knives have a downward component of movement.

The element 7 is further preferably so positioned, by inclination of the grinding surface 18 thereof with respect to the path of movement of the knives, that particles of grit and metal resulting from the grinding action may fall downward freely and will not collect on or impinge against the lower portion of the grinding surface. In machines of this character, the knives are usually rotated in a substantially vertical plane, and in accordance with the present invention it is proposed to incline the plane defined by the grinding surface 18 of the element 7 away from the path of movement of the knives in a downward direction, for example as illustrated more particularly in Figure 2 of the drawing. Thus the shaft 16 which supports the grinding element may be disposed in a substantially vertical plane, but is inclined in that plane so as to afford the desired inclination of the grinding surface 18, the degree of inclination being relatively slight and preferably only sufficient to permit free downward discharge of foreign particles from the zone of contact of the surface with the rotating knives, for example about 2°. It will of course be appreciated that the plane of the grinding surface and the plane defined by the path of movement of the knife edges must be substantially coincident in order to ensure proper grinding contact over substantially the entire blade edge. This may be achieved by properly setting the blade so that the portion of the cutting edge thereof which is of less radius is slightly in advance of the portion of the cutting edge of greater radius, as shown in Figures 1 and 2 of the drawing, whereby the inner portion of the blade projects in an axial direction beyond the outer portion of the blade. In practice, owing to the fact that the grinding surface is curved so that the central portion of the blade contacts with the surface in advance of the inner and outer portions thereof, the blade is ground to a slightly elliptical shape as viewed in Figure 1, the curvature being so small that it cannot be illustrated.

It will be observed that the grinding surface thereof, and it is found that the efficiency of the movement of the knives that the cutting edge of each blade first contacts with the near edge of the annulus defined by the grinding surface and sweeps across this surface to the inner edge thereof, and it found that the efficiency of the grinding operation is thereby improved. It will also be noted that the grinding surface is rotated in such a direction as to facilitate the removal of bits of metal and grit away from the front edge of the knife, and downward discharge of these foreign particles is further expedited by the downward divergence of the plane of rotation of the knives and the plane of the grinding surface.

It will be further appreciated that the arrangement is such that each blade contacts only the near side, with respect to the direction of movement of the blades, of the annular grinding surface, the blades clearing the lower portion of the annulus owing to the outward inclination of the grinding surface hereinbefore referred to. This clearance is preferably sufficient to permit of the use of a guard or shield 8 which extends between the lower portion of the grinding surface and the path of movement of the blades, and which serves to deflect from the lower portion of the grinding surface any foreign particles discharged in the course of the grinding operation, and facilitates collection of such particles and the segregation thereof from the shredded tobacco.

It is important to note that the cutting machine disclosed herein is of the type in which the cutting edges of the blades are disposed more nearly radially than tangentially of the axis of rotation of the support 4, as distinguished, for example, from circular blades in which the cutting edge is concentric with the support or nearly so. In accordance with the present invention, the inclination of the grinding face is much less than that sometimes employed to conform to the bevel of the cutting edge of a circular, or nearly circular blade, the purpose and function of the inclined grinding face when so employed being quite different from that contemplated herein.

In order that gummy substances, derived from the juice of the tobacco, may not collect on the cutting blades and the grinding surface so as to interfere with the sharpening operation, it is desirable to maintain the grinding surface in a moist condition. This moistening of the grinding surface has been found particularly effective when employed in conjunction with the relatively inclined disposition of the grinding surface and the rotational path of the blades, adherence of foreign particles to the moist surface being minimized by the free downward discharge of these particles, and by the use of the shield 8, as hereinbefore explained. Various methods may be employed for maintaining the grinding surface moist, and two forms of apparatus for performing this function are illustrated herein.

In the arrangement shown in Figures 1 and 2, liquid is introduced into a conduit 12 which communicates with the interior of the grinding element 7. The outer and inner surfaces of the peripheral wall 13 of the element and of the rear wall 15 thereof are covered or impregnated with shellac or other moisture-proofing material, or are otherwise rendered impervious to liquid. Thus the liquid introduced through the conduit 12 moves toward the grinding surface 18 and is thrown by centrifugal force across the latter, so that both the grinding surface and the knives are effectively moistened. A disc 14, suitably retained against rotation, is disposed within the grinding element 7 and serves as a closure for the otherwise open side thereof, so as to block the spraying and spattering of the liquid and ensure the escape of liquid at the desired point. It will be appreciated that while the disc 14 fits fairly snugly within the grinding wheel, so as to prevent the discharge of an exces of liquid from one or two circumferentially disposed points only, the slight irregularity of the inner surface of the wheel is such as to permit seepage of liquid

about substantially the entire periphery of the disc, thus ensuring an even and steady flow of liquid across the grinding face of the wheel.

It has been heretofore proposed to introduce liquid to the interior of a hollow grinding wheel and to permit the liquid to seep through the pores of the wheel to the grinding surface, and to control the rate of delivery of liquid by partially coating the interior of the wheel. This is not, however, satisfactory in practice, at least for the moistening of wheels which are used in the manner and for the purposes described in this application, complete moisture-proofing so as to ensure direct delivery of liquid to the grinding face being essential for effective results.

Under some conditions the simpler construction shown in Figures 3 and 4 has been found satisfactory. The construction of the cutting machine and of the grinding wheel may be similar to that shown in Figures 1 and 2, but in lieu of the delivery of liquid to the interior of the wheel, an atomizer including an air conduit 9 and a liquid conduit 10 is employed. Air under pressure through the conduit 9 serves to spray liquid rising in the conduit 10 directly across the grinding surface 18 of the wheel.

Water may be employed for the purpose of moistening the grinding surface, but other liquids may be used. For example, glycerine and other polyhydric alcohols, occasionally employed for the treatment of cigarette tobacco and the like, are found to function effectively.

In the construction shown in Figures 1 and 2, it is feasible from a practical standpoint to omit the impervious coating on the outer surfaces of the grinding element 7. Coating of both the inner and outer surfaces is preferred only because it is found that some slight advantage is thereby derived, it being posible to use less water and to ensure that all of the water is discharged across the face of the grinding wheel and that no part thereof is permitted to escape through the peripheral or rear walls. It is, however, quite important to coat the inner surfaces of the grinding element 7. Thus, it is found that if the outer and not the inner surfaces are waterproofed, the water seeps into the stone and emerges on the grinding surface 18 only at points immediately adjacent the outer periphery of that surface, so that the major portion of the grinding surface remains dry with the result that it becomes gummy and hot. If moistureproofing is omitted altogether, the seepage to the grinding surface is wholly inadequate.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a tobacco cutting machine of the rotary type, the combination with a cutting blade rotatable in a substantially vertical plane and having the cutting edge thereof inclined radially and axially with respect to a tangent to the direction of movement of the blade, of a grinding element having an annular grinding surface defining a plane slightly inclined away from the plane of rotation of said blade in a downward direction, said grinding surface extending in proximity to the path of movement of said blade at a point in such path where the blade has a downward component of movement to engage and sharpen the latter, whereby particles of metal and grit discharged downwardly during the grinding may fall free of the lower portion of said grinding surface, said blade being so positioned that the cutting edge thereof is at least momentarily substantially coincident with the plane defined by the grinding surface during contact of the latter with the blade, and supporting means for said blade and element retaining the same against relative bodily displacement during grinding engagement thereof.

2. In a tobacco cutting machine of the rotary type, the combination with a cutting blade rotatable in a substantially vertical plane and having the cutting edge thereof inclined radially and axially with respect to a tangent to the direction of movement of the blade, of a grinding element having an annular grinding surface defining a plane slightly inclined away from the plane of rotation of said blade in a downward direction, said grinding surface extending in proximity to the path of movement of said blade at a point in such path where the blade has a downward component of movement to engage and sharpen the latter, whereby particles of metal and grit discharged downwardly during the grinding may fall free of the lower portion of said grinding surface, and means for supplying moisture to said grinding surface, said blade being so positioned that the cutting edge thereof is at least momentarily substantially coincident with the plane defined by the grinding surface during contact of the latter with the blade, and supporting means for said blade and element retaining the same against relative bodily displacement during grinding engagement thereof.

3. In a tobacco cutting machine of the rotary type, the combination with a cutting blade rotatable in a substantially vertical plane, of a grinding element having a grinding surface constituting an annulus defining a plane slightly inclined away from the plane of rotation of said blade in a downward direction, said grinding surface extending in proximity to the path of movement of said blade to engage and sharpen the latter, whereby particles of metal and grit discharged downwardly during the grinding may fall free of the lower portion of said grinding surface, and a supporting structure for said blade and grinding element maintaining the same against displacement axially of the rotational axis of the blade and maintaining the grinding element in such position with respect to the path of movement of the blade that the blade sweeps across circumferentially spaced portions of the annulus but engages only that portion first approached.

4. In a tobacco cutting machine of the rotary type, the combination with a cutting blade rotatable in a substantially vertical plane, of a grinding element having a grinding surface constituting an annulus defining a plane slightly inclined away from the plane of rotation of said blade in a downward direction, said grinding surface extending in proximity to the path of movement of said blade to engage and sharpen the latter at a point in such path where the blade has a downward component of movement, and a supporting structure for said blade and grinding element maintaining the same against displacement axially of the rotational axis of the blade and maintaining the grinding element in such position with respect to the path of movement of the blade that the blade sweeps across circumferentially spaced portions of the annulus but engages only that portion first approached.

5. In a tobacco cutting machine of the rotary type, the combination with a cutting blade rotatable in a substantially vertical plane, of a grinding element having a grinding surface constituting an annulus defining a plane slightly inclined away from the plane of rotation of said blade in

a downward direction, said grinding surface extending in proximity to the path of movement of said blade to engage and sharpen the latter, and guard means disposed adjacent the lower portion of said grinding surface and between the latter and the path of the blade to deflect and segregate falling particles of grit and metal.

6. In a tobacco cutting machine of the rotary type, the combination with a cutting blade rotatable in a substantially vertical plane, of a grinding element having a grinding surface constituting an annulus defining a plane slightly inclined away from the plane of rotation of said blade in a downward direction, said grinding surface extending in proximity to the path of movement of said blade to engage and sharpen the latter, means for supplying moisture to the grinding surface, and guard means disposed adjacent the lower portion of said grinding surface and between the latter and the path of the blade to deflect and segregate falling particles of grit and metal therefrom.

7. In a tobacco cutting machine of the rotary type, the combination with a cutting blade rotatable in a substantially vertical plane, of a grinding element having an annular grinding surface defining a plane slightly inclined away from the plane of rotation of said blade in a downward direction, said grinding surface extending in proximity to the path of movement of said blade at a point in such path where the blade has a downward component of movement to engage and sharpen the latter, whereby particles of metal and grit discharged downwardly during the grinding may fall free of the lower portion of said grinding surface, and guard means extending between the lower portion of said annular grinding surface and the path of movement of said blade to deflect and segregate falling particles of grit and metal therefrom.

8. In a tobacco cutting machine of the rotary type, the combination with a cutting blade rotatable in a substantially vertical plane and having the cutting edge thereof so inclined radially and axially with respect to a tangent to the direction of movement of the blade, of a grinding element having a lateral annular surface coacting with said blade to sharpen the latter, said surface defining a plane inclined with respect to the plane of rotation of said blade in such manner that said planes diverge downwardly from the zone of contact of said surface and blade, said element being positioned to engage said surface and blade at a point in the path of movement of the blade where the latter has a downward component of movement, and means for rotating said element in a direction reverse to the direction of rotation of said blade, said blade being so positioned that the cutting edge thereof is at least momentarily substantially coincident with the plane defined by the grinding surface during contact of the latter with the blade, and supporting means for said blade and element retaining the same against relative bodily displacement during grinding engagement thereof.

9. In a tobacco cutting machine of the rotary type, the combination with a cutting blade rotatable in a substantially vertical plane, of a grinding element having a grinding surface defining a plane slightly inclined away from the plane of rotation of said blade in a downward direction, said grinding surface extending in proximity to the path of movement of said blade to engage and sharpen the latter, means for supplying moisture to said grinding surface, and means extending between the path of movement of the blade and said grinding surface for segregating from the cut tobacco foreign particles and moisture discharged from the grinding zone.

10. In a tobacco cutting machine of the rotary type, the combination with a cutting blade rotatable in a substantially vertical plane, of a grinding element having a grinding surface defining a plane slightly inclined away from the plane of rotation of said blade in a downward direction, said grinding surface extending in proximity to the path of movement of said blade to engage and sharpen the latter, and means extending between the path of movement of the blade and said grinding surface for segregating from the cut tobacco foreign particles discharged from the grinding zone.

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