My invention relates to improvements in multiple-bladed cutting and slicing machines.

The objects of my invention are:

1. To provide a simple, practical multiple-bladed cutting and slicing machine for light work such as slicing bread and various similar articles;

2. To provide a concentric, variable drive mechanism by which adjacent sections of a sectional drive pulley may be driven at different speeds;

3. To provide a sectional drive pulley in which adjacent sections may be driven at different speeds;

4. To provide means by which a plurality of blades may be applied successively to slice or cut a given object.

I attain these objects by the means illustrated in the accompanying drawings, in which,—

Figure 1 is a rear elevation of my machine with the rear plate of the housing omitted and showing a portion of the feeder driving mechanism in section on the line 1—1 of Figure 2, and with a part of the feeder driving mechanism omitted for clearness; Fig. 2 is a side elevation showing the band pulleys and drive mechanism therefor in section on the line 2—2 of Figure 1 but with the near side plate of the housing omitted to disclose the interior of the machine and for clearness omitting the idlers, 86, and their supports, 96; Fig. 3 is a horizontal section looking downwardly upon the line 3—3 of Figure 2; Fig. 4 is an enlarged sectional detail of the feeder head on the line 4—4 of Figure 2; and Figure 5 is a rear elevation of my appliance with a portion of the rear plate of the housing broken away to disclose a portion of the feed driving mechanism which for clearness is omitted from Figure 1; Fig. 6 is a detail plan view of the bread-receiving table, 21, and brackets supporting same showing a portion of the column, 1, in section.

Similar numerals refer to similar parts throughout the several views.

My apparatus comprises a housing of thin sheets of metal, including a base plate, 64, lower front plate, 63, and upper front plate, 67, with a horizontal front plate, 66, joining the upper and lower front plates, 67 and 63, respectively, and forming a feed table through which a chute, 24, projects upwardly by means of which the bread is fed onto the feeder, 28.

An opening, 92, is formed in the rear plate, 69, of a suitable size to permit the passage of a loaf of bread and a horizontal plate, 66', is mounted adjacent the lower edge of the opening through which the bread or other article to be sliced may be withdrawn after being sliced. The rear opening, 92, may be enlarged as shown in dotted lines at 95 to allow the operator to reach in and remove the bread from the receiving table, 21, or from the plate, 66', if desired.

In the drawings I have shown the loaves of bread in process of being fed to the slicing bands, but it is obvious that other articles may be fed to the slicing bands in the same way or the feeding appliance may be varied to meet the requirements of the particular things to be cut or sliced.

The housing is preferably so formed as to completely enclose the moving parts of the machine and is provided to promote safety of the operator and to keep the working parts of the machine clean and free from dust.

My apparatus includes a base, 38, to which is united a column or frame, 1, which may be cast integral with the base or suitably secured thereto. The column, 1, has formed integral therewith, upper and lower bosses, 22 and 91, respectively, which form supports for the bearings of the idler and driving shaft assemblies respectively.

My cutting appliance comprises stepped driving conical pulleys, 42 and 43, and idler conical pulleys, 16 and 10, and mounted upon the driving conical pulleys and the idler conical pulleys is a plurality of cutting blades, 18. The blades or cutting bands, 18, may be in the form of saw blades with small teeth upon the the front edge thereof or they may be formed with straight sharpened cutting edges or with the cutting edges slightly indented or undulating as desired, for any particular class of materials to be sawed, cut or sliced.
When built for slicing bread, the blades should be placed about half an inch apart laterally so as to cut slices approximately half an inch thick. In order to slice a twelve inch loaf of bread, 52 blades will be required and the number may be increased or diminished as the work to be done requires.

For light materials such as bread, blades three-sixteenths or one-quarter of an inch wide will be ample. For such a machine for twelve inch loaves, I use 22 blades and divide the drive pulley into two sections or two separate adjacent pulleys, 42 and 43, as shown in Figure 2, each of which will carry 11 blades.

In order to space these bands half an inch apart laterally, I provide a series of circular seats in the periphery of the conical pulleys, 42 and 43. Corresponding seats are provided in the periphery of the idler conical pulleys, 16 and 10.

In order to avoid too great a difference in the speed of the cutting bands, 18, I divide the drive pulley into a plurality of sections. In Figure 2 I have shown the drive pulley divided into two sections, 42 and 43, but it is obvious that a larger number of sections may be employed if desired.

I mount the smaller conical pulley or section, 42, upon the front end of a drive shaft, 40, securing the section, 42, to the shaft, 40, by a pin, 39, or other suitable means.

I mount the drive section, 43, upon the front end of a drive tube or hollow shaft, 49. This drive tube, 49, is revolvably mounted in bearings, 47 and 50, seated in the boss, 39. The bearings, 47 and 50, may be of any standard type, but I prefer to use ball or roller bearings for the drive shafts, both solid and hollow, to permit the cutting bands to be driven at high speed.

A collar, 48, is formed integral with or mounted upon the drive tube, 49, which acts as a spacer to keep the section, 43, at a given distance from the boss, 45.

Within the front end of the drive tube, 49, I mount another bearing, 46, in which the front end of the shaft, 40, revolves.

Upon the rear end of the tube, 49, I mount a pulley, 52, and key or otherwise secure it to the drive tube, 49.

Within the rear end of the drive tube, 49, I mount another bearing, 53, which forms a bearing for the rear end of the shaft, 40.

Upon the extreme rear of the shaft, 40, I secure a pulley, 57, by a key, 56, spline or other suitable means.

A motor, 62, is mounted upon the base, 38, and upon the rear end of the motor shaft, 62', are mounted drive pulleys, 59 and 60. A belt, 58, passes around the drive pulley, 60, and the driven pulley, 52. A similar belt, 55, passes around the drive pulley, 59, and the driven pulley, 57.

I proportion the diameter of the pulleys, 60, 52, 59 and 57, and the diameter of the pulleys, 42 and 43, so that the lineal travel in feet per minute of the front cutting band upon the section, 42, will be the same as the rate of travel of the front cutting band upon section 43. Where the conical drive pulley is divided into more than two sections, the various pulleys and sections should be similarly proportioned. It is obvious that a plurality of hollow drive shafts may be used with a pulley section mounted upon each of them.

Similar stepped conical pulleys, 16 and 10, are similarly mounted upon the idler shaft, 14, in bearings, 19—13, and the idler tube or hollow shaft, 7, running in bearings, 3—3.

A lock washer, 4, is secured upon the rear end of the shaft, 14, by a nut, 5, the rear end of the shaft, 14, being threaded to receive the nut, 5. The pulley, 52, has a smaller pulley, 52', formed integral therewith.

Bosse, 37, are formed integral with the base, 38, and have a shaft, 36, pivotally mounted therein. Arms, 35 and 35', have their lower ends splined or keyed to the shaft, 36, and are thus fulcrumed in the bosses, 37.

Supports, 44, are formed integral with the base, 38, having their upper ends united to form a prolonged bearing for a shaft, 82. The outer end of the shaft is fitted with a washer, 88, and has threaded thereon a nut, 82'. The inner end of the shaft, 82, has mounted thereon a pulley, 33, secured to the shaft by a pin, 39, or other suitable means. The pulley, 33, has a crank, 31, formed integral therewith or united thereto upon which a cam roller, 32, is revolvably mounted so as to travel within a loop or opening, 30, formed in the arm, 35.

To the upper ends of the arms, 35 and 35', is united a pusher head, 29, made up of a plurality of narrow fingers, 28, united at the front as shown in Figure 3. These fingers, 28, are made narrow enough to pass between the cutting bands, 18, and the outer fingers, 28, are formed integral with flanges, 81, which serve to prevent the loaves of bread or other articles being fed to the cutting blades, from being displaced laterally. The rear end of the upper portion of the fingers, 28, is cut away as shown in Figure 2. The lower portion of the fingers form a support to carry the bread as it passes through the cutting blades and to deliver it to a receiving table, 21, mounted upon brackets, 19, secured to the column, 1, with side plates, 20, to prevent the bread from being displaced laterally.

As the bread passes from the receiving table, 21, it drops upon the plate, 66', and may be removed through the opening, 52, in the rear plate of the housing.

Supports, 96, secured to the column, 1, by bolts, 98, have revolvably mounted upon their outer ends idler pulleys, 86. A belt, 51, passes around the pulley, 52', over the idler pulleys, 86, and around the pulley, 33.
In the operation of my machine, as the motor shaft, 62', is driven by the motor, 62, it revolves the pulleys, 59 and 60, and through the belts, 55 and 58, drives the pulleys; 57 and 52, thus driving the shaft, 40, and the hollow shaft, 49. These shafts in turn drive the pulleys, 42 and 43, causing the bands, 18, to travel around the idler pulleys, 16 and 10.

As the pulley, 52, revolves, it carries with it the pulley, 52', which through the belt, 51, drives the pulley, 52. As the pulley, 52, revolves, the crank, 31, causes the roller cam, 32, to travel in the loop, 30, of the arm, 35, thus causing the pusher head, 29, to carry the loaf of bread as received from the chute 24, against the slicing bands, 18, where it is sliced. When the pusher head, 29, has carried the loaf of bread through the cutting blades, it is drawn back to its original position as shown in Figure 2, and the operation is repeated. Each succeeding loaf of bread, after being sliced, drives the preceding loaf along the receiving table, 21.

The side plates, 20, of the receiving table, 21, may be formed of resilient material which will aid in retaining the slices of bread in their original position as they pass over the table, 21, or side springs, 20', may be secured to the side plates, 20, which will exercise a yielding pressure upon the sliced loaf of bread to retain the slices in their original position.

The bread may be placed upon the table, 66, and fed into the chute, 24, manually or by mechanical feed as desired.

The free ends of the lower fingers, 28, are preferably sloped downward slightly so as to pass under the receiving table, 21, as shown in dotted lines in Figure 2, and the pusher head may be formed slightly wider than the table, 21, so that the flanges, 31, will pass outside of the side plates, 20 or either the flanges, 21, or the side plates, 20, may be shortened to prevent interference with the other.

In describing my apparatus, I have referred to the left side of Figure 2 as the front of the machine, being the side from which the bread is fed into it, and to the right side of Figure 2, as the rear of the machine, being the side from which the bread is removed.

The housing may be of plain sheets of metal with angular corners united by rivets, 40, and with ornamental, nickel plated strips, 99, added thereto for ornamentation.

In describing the cutting bands, I used the term "bands" to apply either to narrow band saws or to continuous bands having the front edges sharpened like a knife blade.

For most purposes, these bands may be very narrow—from a quarter to three-sixteenths of an inch in width being ample, and the bands are preferably made of very thin, rust-proof material which will not rust nor corrode.

The conical pulleys or pulley sections may be cast hollow as shown in Figure 2, with open spaces, 11, 17, 41 and 44, left therein or they may be formed of wood, micarta or other suitable material of any kind.

The upper and lower fingers of the feeder head, 28, may be entirely separate or they may be joined by a web portion, 28', as shown in dotted lines in Figure 2, and all of the fingers except the two outside ones, should terminate at the point shown by the web. As so arranged, the lower fingers form a support for the loaf of bread, 27, and the webs, 28', and the ends of the intermediate upper fingers will press against the loaf of bread, 27, to force it against the slicing blades, 18, as the feeder advances.

I claim:

1. A cutting or slicing machine of the type described, comprising a base, a frame united thereto, upper and lower bearings secured in the frame, a plurality of concentric drive shafts mounted in one of the bearings and a plurality of concentric idler shafts mounted in the other bearing, a stepped conical pulley secured upon the front end of each of the drive shafts and a corresponding conical pulley secured upon the front end of each of the idler shafts, a plurality of cutting or slicing bands mounted upon the conical pulleys, and means for driving the drive shafts simultaneously but at different relative speeds.

2. A cutting or slicing machine of the type described, comprising a base, a frame united thereto, upper and lower bearings secured in the frame, a plurality of concentric drive shafts mounted in one of the bearings and a plurality of concentric idler shafts mounted in the other bearing, a pulley secured upon the front end of each of the drive shafts and a corresponding pulley secured upon the front end of each of the idler shafts, a plurality of cutting or slicing bands mounted upon the pulleys, and means for driving the drive shafts simultaneously but at different relative speeds.

3. A cutting or slicing machine of the type described, comprising a base, a frame united thereto, upper and lower bearings secured in the frame, a plurality of concentric drive shafts mounted in one of the bearings and a plurality of concentric idler shafts mounted in the other bearing, a stepped conical pulley secured upon the front end of each of the drive shafts and corresponding conical pulleys secured upon the front end of each of the idler shafts, a plurality of cutting or slicing bands mounted upon the conical pulleys, means for driving the drive shafts simultaneously but at different relative speeds, and means to feed the material to be sliced to the cutting bands.

4. A cutting or slicing machine of the type described, comprising a base, with a frame united thereto containing upper and
lower bearings, a drive shaft and an idler shaft mounted in said bearings, a stepped conical pulley mounted upon each of said shafts, a plurality of cutting bands mounted upon said pulleys, means for driving the drive shaft, a feeder arm having its lower end pivotally mounted in the base and its upper end enlarged and slotted so as to form fingers adapted to pass between the cutting bands, the upper portion of the outer end of the fingers being cut away and the lower portion forming a seat adapted to receive and carry a loaf of bread or other material to be sliced, and means for driving the feeder arm.

5. A cutting or slicing machine of the type described, comprising a base, a frame united thereto, a plurality of cutting bands longitudinally movable in the frame, means for driving the bands, a feeder arm having its lower end pivotally mounted in the base and its upper end enlarged and slotted so as to form fingers adapted to pass between the cutting bands, the upper portion of the outer end of the fingers being cut away and the lower portion forming a seat adapted to receive and carry a loaf of bread or other material to be sliced, and means for driving the feeder arm.

6. A cutting or slicing machine of the type described, comprising a base, a frame united thereto, a plurality of cutting bands longitudinally movable in the frame, means for driving the bands, a feeder arm having its lower end pivotally mounted in the base and its upper end enlarged and slotted so as to form fingers adapted to pass between the cutting bands, the upper portion of the outer end of the fingers being cut away and the lower portion forming a seat adapted to receive and carry a loaf of bread or other material to be sliced, means for driving the feeder arm, and a receiving table mounted upon the frame at the rear of the cutting bands adapted to receive the sliced material as it leaves the bands and having side plates adapted to retain the slices in their original position.

7. A cutting or slicing machine of the type described, comprising a base, a frame united thereto, upper and lower bearings secured in the frame, a plurality of concentric drive shafts mounted in one of the bearings, an idler shaft mounted in the other bearing, a stepped conical pulley mounted upon the front end of each of the drive shafts, corresponding idler pulleys mounted upon the idler shaft, a plurality of cutting or slicing bands mounted upon the conical pulleys and the idler pulleys, and means for driving the drive shafts simultaneously but at different relative speeds.

In testimony whereof he affixes his signature.

HARRY J. CRINER.