Dec. 11, 1934. C. M. E. WENDNAGEL 1,983,719

CHAMFERING MACHINE

Filed June 9, 1933 5 Sheets-Sheet 1

Fig. 1.

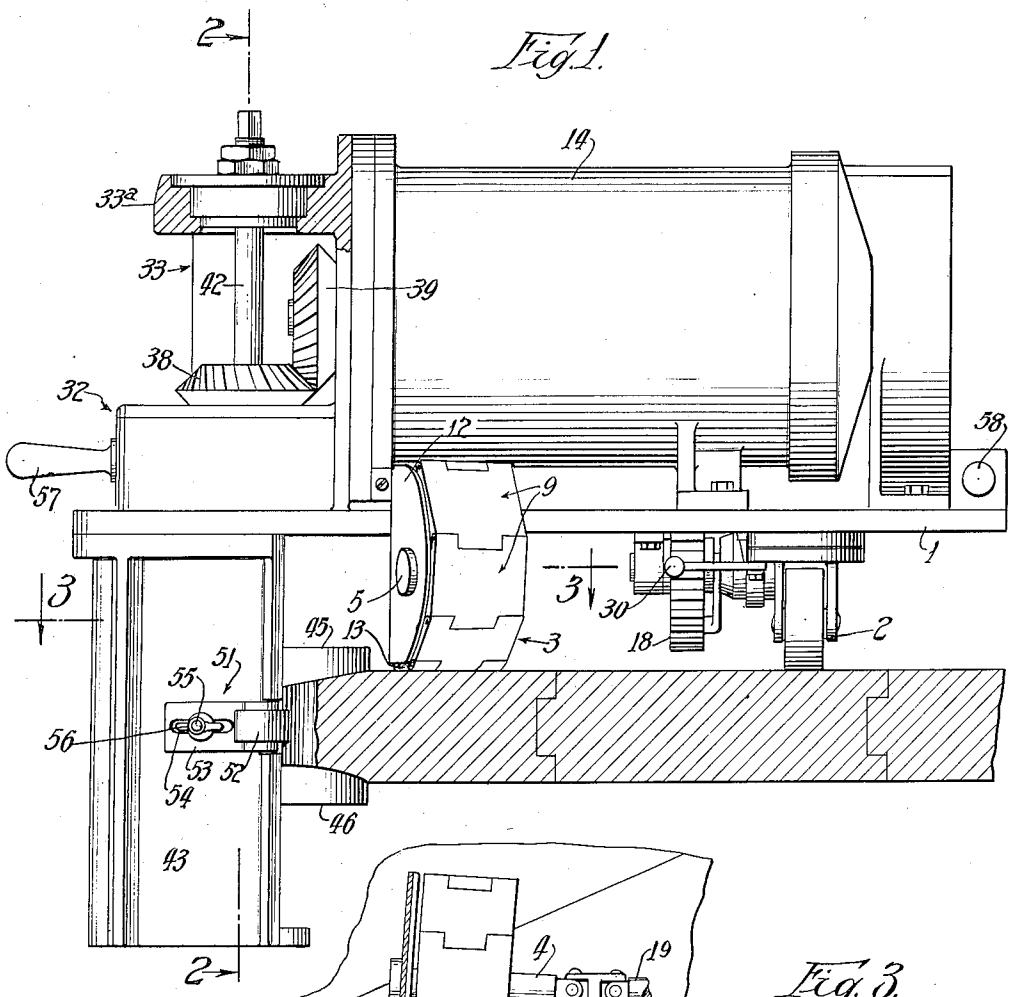
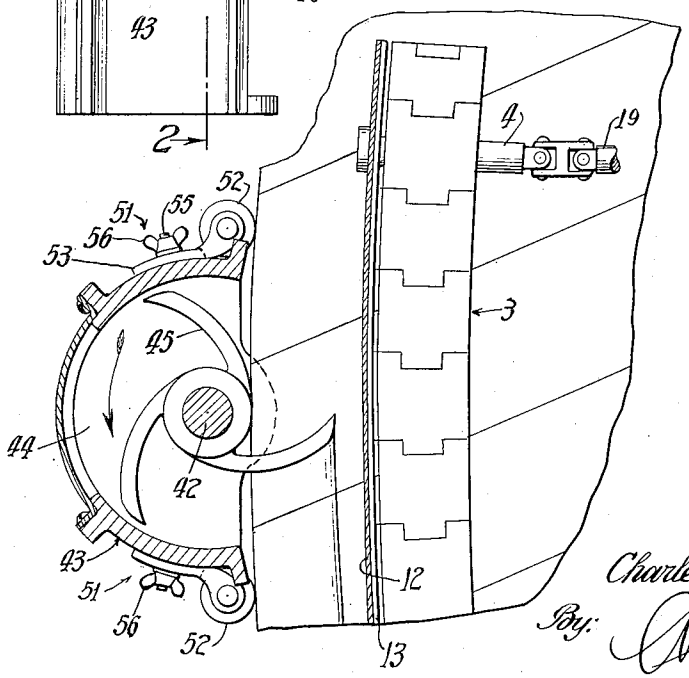


Fig. 3.



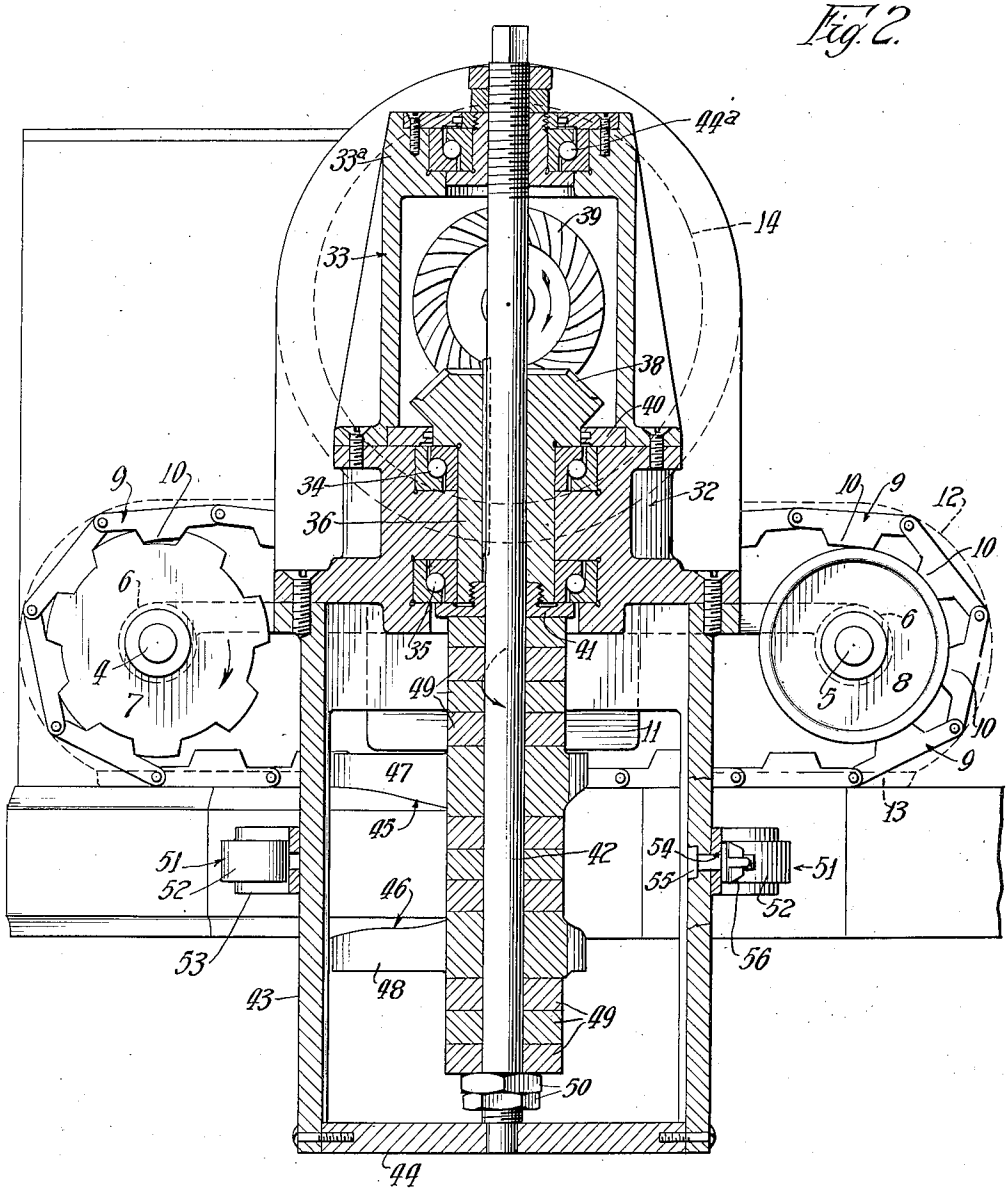
Inventor:
Charles M. E. Wendnagel,
By: Arthur M. Nelson
Atty.

Dec. 11, 1934. C. M. E. WENDNAGEL 1,983,719

CHAMFERING MACHINE

Filed June 9, 1933 5 Sheets-Sheet 2

Fig. 2.



Inventor:
Charles M. E. Wendnagel,
By: Arthur W. Nelson
Atty.

Dec. 11, 1934. C. M. E. WENDNAGEL 1,983,719

CHAMFERING MACHINE

Filed June 9, 1933 5 Sheets-Sheet 3

Fig. 4.

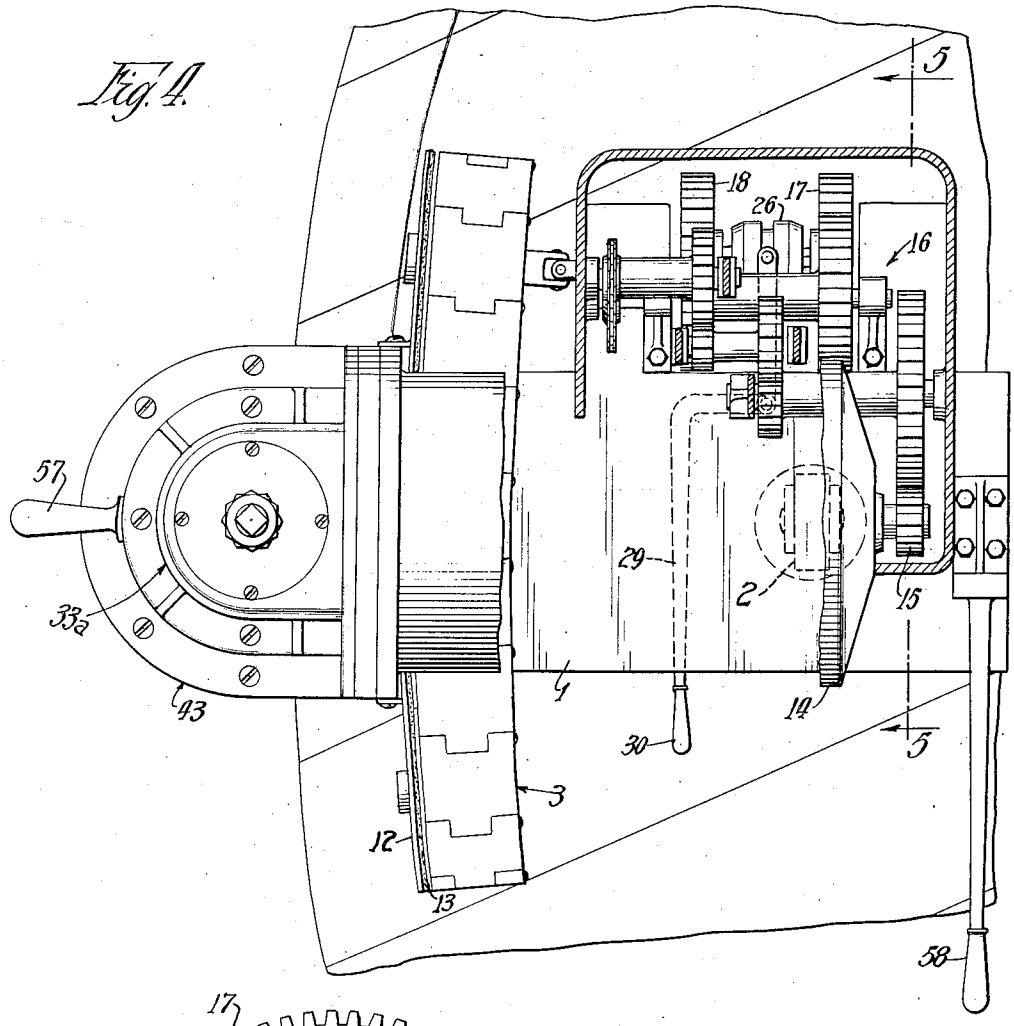
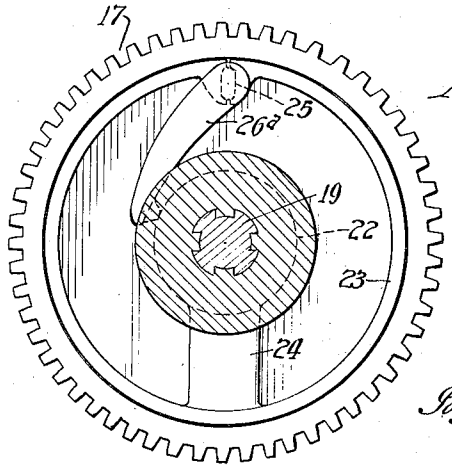


Fig. 8.



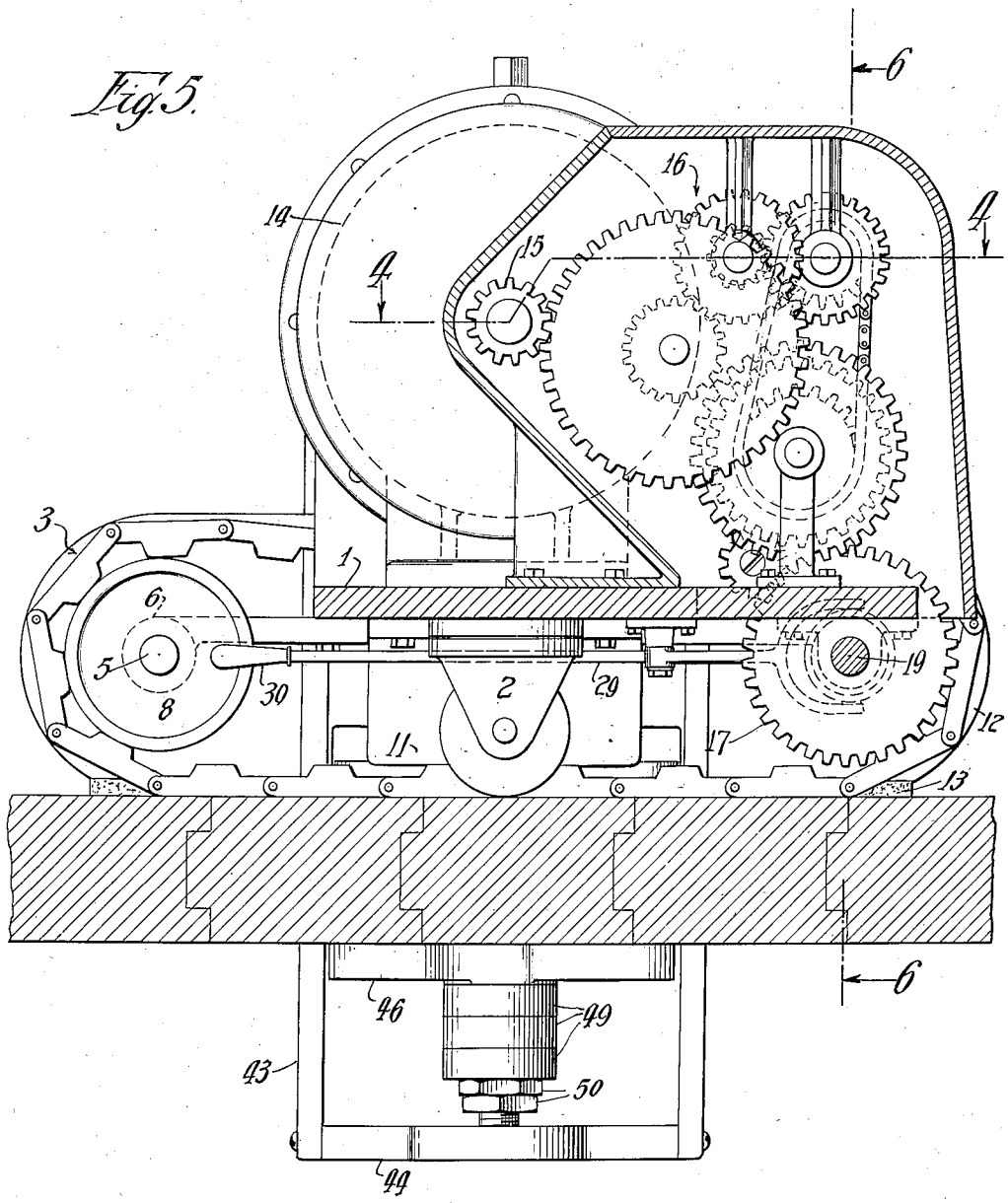
Inventor:
Charles M. E. Wendnagel,
By: Arthur W. Peles
Atty.

Dec. 11, 1934. C. M. E. WENDNAGEL 1,983,719

CHAMFERING MACHINE

Filed June 9, 1933 5 Sheets-Sheet 4

Fig. 5.



Inventor:
Charles M. E. Wendnagel,
By: Arthur W. Nelson
Atty.

Dec. 11, 1934. C. M. E. WENDNAGEL 1,983,719

CHAMFERING MACHINE

Filed June 9, 1933 5 Sheets-Sheet 5

Fig. 6.

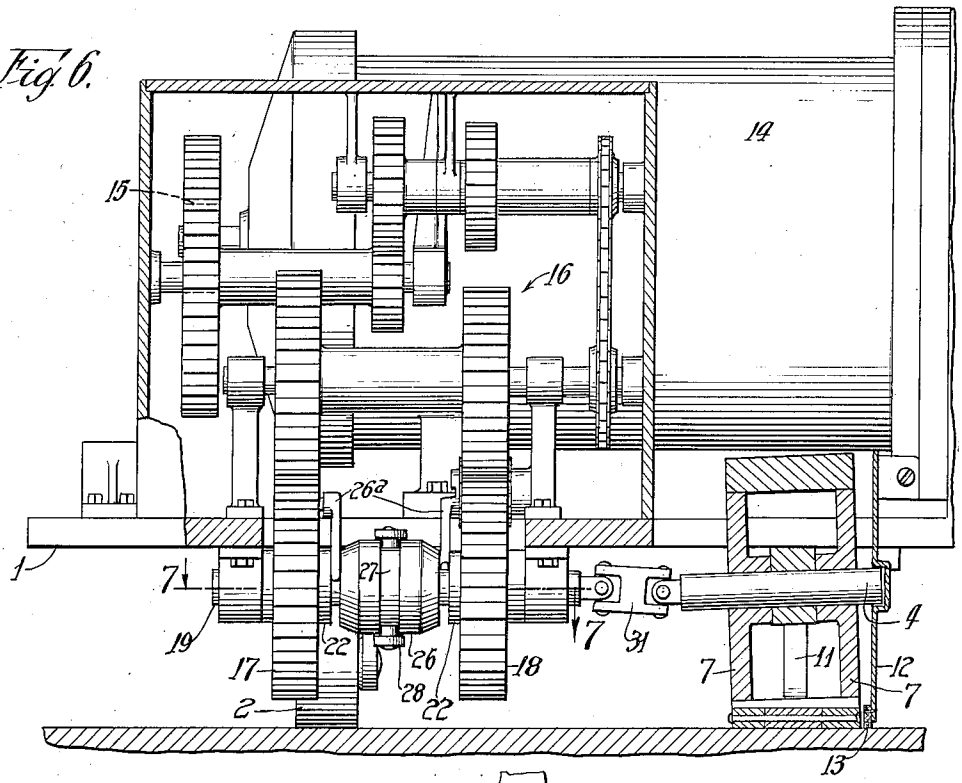
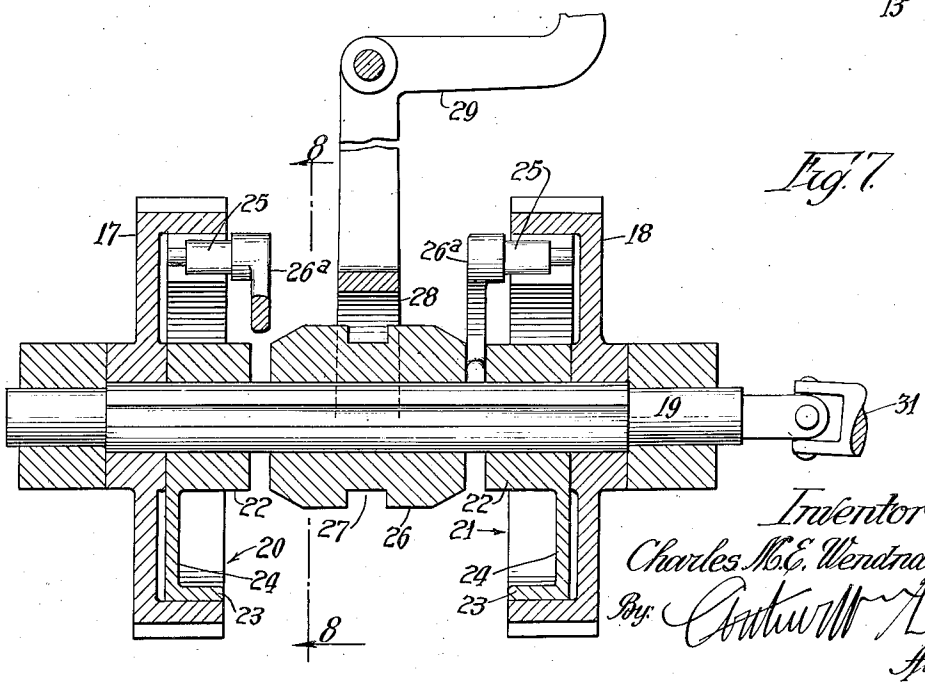


Fig. 7.



Inventor:
Charles M. E. Wendnagel,
By: Arthur W. Nelson
Atty.

Patented Dec. 11, 1934 1,983,719

UNITED STATES PATENT OFFICE

1,983,719

CHAMFERING MACHINE

Charles M. E. Wendnagel, Chicago, Ill.

Application June 9, 1933, Serial No. 675,059

15 Claims. (Cl. 147—40)

This invention relates to improvements in chamfering machines and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

In the manufacture of the larger sizes of wooden vats or tanks, great difficulty is encountered in properly chamfering the edges of the bottom for engagement in the grooves of the associated staves. If the chamfering is faulty, assembly would be difficult and leakage might occur.

One of the objects of the present invention is to provide a machine especially adapted for accurately chamfering vat or tank bottoms of large diameter, regardless of the outline or shape thereof as well as upon work of other kinds.

Another object of the invention is to provide a machine of this kind which is self-propelled around the top and bottom margins of the bottom being chamfered and which, to a certain extent is self-guiding and is accurate though the bottom be uneven.

A further object of the invention is to provide a machine of this kind which is not only fast in operation but which may be quickly adjusted for operation on vat bottoms of different thicknesses.

Still another object of the invention is to provide a machine of this kind which is simple and durable in construction and is easy to operate even by an inexperienced workman.

The above mentioned objects of the invention, as well as others, together with the several advantages thereof will more fully appear as I proceed with my specification.

In the drawings:

Fig. 1 is a view in side elevation of one form of chamfering machine embodying my invention, illustrated in operative relation upon a vat bottom being operated upon and which vat bottom is shown substantially all in section;

Fig. 2 is a vertical sectional view through the front or cutter end of the machine as taken on the line 2—2 of Fig. 1;

Fig. 3 is a horizontal sectional view through a part of the machine as taken on the line 3—3 of Fig. 1;

Fig. 4 is a top plan view of the machine in position upon the vat bottom being operated upon, with parts of the machine shown as being broken away and in section to better illustrate the construction thereof;

Fig. 5 is a transverse vertical sectional view on an enlarged scale through the rear end of the machine as taken on the line 5—5 of Fig. 4;

Fig. 6 is a detail longitudinal vertical sectional view as taken on the line 6—6 of Fig. 5;

Fig. 7 is a detail longitudinal sectional view through the driving shaft for an endless tread forming a part of the invention; and

Fig. 8 is a detail vertical sectional view on an enlarged scale through a part of the driving mechanism of the machine as taken on the line 8—8 of Fig. 7.

In general, my improved chamfering machine includes a carriage or support adapted for movement around the margin of the vat or tank bottom operated upon. Said support includes a horizontally disposed plate mounted at one end upon an endless traction tread member and carrying a swiveling caster on its other end. On the first mentioned end of the carriage or support is mounted a head or casing in which is journalled a driven shaft carrying a pair of rotary cutters for operating upon the top and bottom margins of the vat bottom near its edge to chamfer the same.

The rotary cutters are so mounted on said driven shaft as to be adjustable toward and away from each other, to accommodate different thicknesses of vat bottoms upon which it might be desired to operate. The head or casing is provided with means that have a rolling engagement with the edge of the vat bottom. This means is capable of being adjusted or set to determine the gauge or radial depth of the chamfering cut to be made.

On the carriage or support is mounted an electric motor which not only drives the cutters in their chamfering operations but which also drives, through suitable reduction gearing, the endless tread member by which the machine as a whole is caused to travel around the margin of the vat bottom. Included in said gearing is a clutch for controlling the forward and reverse movement of the machine on the vat bottom and said gearing is provided with a control lever. This control lever may be actuated to provide forward or reverse or may be set in neutral so that the cutters are driven even though the machine is not traveling around the vat bottom margin.

A pair of handles is provided on the machine by which the operator may assist in guiding the movement of the machine and may better hold the machine in the operative position it should occupy to function properly for its intended purpose.

When the machine is in operation, it travels around the margin of the vat bottom and the rotary cutters will chamfer the top and bottom surfaces of said margin to fit in the groove of the associated staves with which it is later assembled. The travel movement of the machine in operation is fairly slow but the cutter speed is relatively high and therefore, the cut made is a sweeping one that insures a smooth planed off chamfer for the vat bottom.

Referring now in detail to that embodiment of the invention, illustrated in the accompanying drawings:

1 indicates as a whole a carriage or support in the form of a horizontally disposed plate having a swiveling caster 2 arranged near its inner end and suitably fixed to the underside thereof. At the front end of the carriage plate an endless traction tread mechanism 3 is provided, which includes shafts 4 and 5 respectively, suitably connected to the underside of the plate 1 by brackets 6—6. These shafts converge slightly toward their inner ends and are radial with respect to the axis of a fairly large vat bottom, say one having a diameter of from 18 to 20 feet.

Fixed to the shaft 4 is a pair of spaced inner and outer sprocket wheels 7 and fixed to the shaft 5 is a pair of smooth faced or untoothed wheels 8 which may be pulley wheels of the desired diameter. Trained about said pairs of wheels is an endless belt made up of broad interconnected links 9. Each link has on one side thereof, a lug 10 for engagement with the recesses or spaces between the teeth of the sprockets 7. The top lap of this belt passes above the top of the plate 1. To hold the active bottom lap against flapping when traveling over an uneven vat bottom, I provide a depending element 11 on the bottom surface of the support and which element has an edge engagement with the lugs on the various links. This keeps the bottom lap of the endless tread mechanism in good tread engagement with the vat bottom. A guard plate 12 is provided at the outside of the tread mechanism and this plate includes a felt sealing strip 13 along its bottom edge. The guard plate and sealing strip coact in preventing the cutters, which rotate at high speed, from throwing chips into or under the tread mechanisms.

On the top side of the carriage plate and extending longitudinally thereof is an electric motor 14. The rear end of the armature shaft of the motor has a pinion 15 secured thereto. This pinion, through suitable speed reduction and associated reverse gearing 16 operates to drive a pair of gears 17 and 18, in opposite directions. These gears 17 and 18, are relatively mounted in spaced relation upon a shaft 19 extending longitudinally of the carriage plate along that side thereof associated with the driving sprockets 7 for the endless traction tread mechanism.

Each gear encompasses a friction clutch member 20 and 21 respectively, both of which are so secured to the shaft 19 as to rotate therewith. Each clutch member includes a hub 22 and an annular band 23 that is connected to the hub by a web portion or spoke 24. Each band is split at one point and arranged between the ends of the band at the split is a spreader cam 25 to which is secured an arm that terminates near the shaft 19. The gearing mentioned is all enclosed in a suitable housing.

Splined on the shaft 19 between the clutch members is a clutch arm actuator 26 that is tapered at each end. This actuator is provided with an annular groove 27 in its periphery to receive studs carried by the bifurcated end 28 of a shifter lever 29. The lever 29 is pivotally mounted on the plate 1 and has a handle 30 extending from that side thereof opposite the gearing.

When the clutch arm actuator stands in a position midway between the clutch members 20—21 as shown in Fig. 7, the gearing is in neutral, and neither gear 17 nor 18 is operative to drive the shaft 19.

However, when the actuator 26 is shifted in one direction or the other, one of its tapered ends engages that arm 26*a* toward which it is moved and acts to swing said arm outwardly. This movement of the arm spreads the clutch band into clutching engagement with the associated gear and locks said gear to the shaft 19 so that said shaft is driven in the desired direction.

As the tread mechanism is made on an arc, and as the shafts 4 and 5 therefor radiate from the axis or center of the arc it is apparent that the shafts 4 and 5 must incline downwardly toward their inner ends as shown in Fig. 6. The inner end of the shaft 4 is connected by a gimbal or universal joint 31 with the associated end of the shaft 19.

The front end of the motor 14 has secured thereto, a suitable head 32. Rising from said head is an open front casing 33 including a top wall 33*a*. The open front of this casing may be closed by a curved cover plate which has been omitted from the drawings for the sake of clearness.

Journalled in the head 32 by means of top and bottom antifriction bearings 34—35 is the elongated hub 36 of an upwardly facing, spiral bevel gear 38 and which gear is disposed in the casing 33. The front end of the armature shaft of the motor extends into said casing and there has fixed to it, a spiral bevel gear 39 that meshes with and drives the gear 38.

The antifriction bearings mentioned are combined thrust and rotative bearings and are held in operative position by retainer rings 40 and 41 respectively. The ring 40 is clamped in place between the head 32 and the bottom of the casing 33 while the retainer 41 has a threaded engagement with the bottom end of the bevel gear hub 36. The bevel gear 38 and its hub 36 have a splined connection with an upright shaft 42.

Fixed to and depending from the head 32 is a rotary cutter casing 43 that is open at both its front and rear. The open front of the cutter casing is usually closed by a cover that has been omitted for clearness in illustration. The bottom end of this casing is formed by a removable wall or plate 44.

The shaft 42 has its bottom end journalled in a suitable opening in the plate 44 while its top end is journalled in an antifriction bearing 44*a* in the top wall 33*a* of the casing 33. This bearing is a combined radial and thrust bearing and associated with said bearing is suitable means for holding the same in its operative position.

Within the casing 43 there are secured to the shaft 42 in suitably spaced relation, top and bottom chamfering cutters 45 and 46. Preferably, each cutter comprises a hub and a plurality of arms 47 and 48 respectively that are curved in the direction of their rotation. The arms of the top cutter have bottom cutting edges and the arms of the bottom cutter have top cutting edges. The cutters are held in spaced relation by means of spacing collars 49 on the shaft 42 and nuts 50 on the bottom end of the shaft operate to clamp the collars and cutters in the desired relation. To change the spaced relation of the cutters to accommodate operations on vat bottoms of different thicknesses, the plate 44 is removed and the clamp nuts 50 are taken off. This gives access to the spacing collars which may be removed and replaced by others to not only properly position the cutters but also to determine the spacing therebetween, on the shaft. After the proper adjustments have been made, the parts are reassembled as before.

On opposite sides of the cutter casing are vat bottom edge engaging guides 51, each in the

form of a roller 52. Each roller which has its axis arranged parallel the shaft 42, is journalled in a plate 53 having a slot 54 therein. A screw 55 carried by the associated side of casing 43 extends through the slot in each plate and a nut 56 is arranged on each screw whereby the associated plate may be clamped in the desired position.

Projecting from the head 32 is a handle 57 and fixed to the rear end of the carriage plate is a second handle 58. By means of these handles, the operator controls and guides the machine, although the arcuate endless tread tends to maintain the machine in position.

Vat bottoms are usually made of heavy boards suitably dowelled together in edge-to-edge relation. In a vat bottom having a large diameter, after the same has been trimmed by sawing to the desired outline shape, it is mounted on suitable supports. Such a bottom will have a flat upright edge.

The machine is then positioned on the margin of the bottom. The rollers 52 are then set to engage the edge of the bottom and thus provide a gauge for the machine in the chamfering operation.

When the motor 14 is started, the cutters 45—46 are rotated at a high speed and cut into the top and bottom margins of the vat bottom in their initial cut. Thereafter the operator through the lever handle 30 throws the traction gearing into operation. This connects the endless tread mechanism to the motor so that the machine as a whole starts its travel about the margin of the vat bottom. The operator by exerting a lateral inward pressure on the handle 57, holds the machine with the rollers 52 engaged with the edge of the vat bottom so that said rollers act as a gauge for the machine. In this movement of the machine the caster 2 swivels into a trailing position that operatively supports the inner end of the machine in its travel around the margin of the vat bottom.

During this travel the top and bottom cutters chamfer off the top and bottom margins of the bottom outside the path of travel of the endless traction tread mechanism. Thus the machine travels around the bottom and simultaneously chamfers the top and bottom surfaces thereof so that they will have a bevelling fit in the grooves of the associated staves when the bottom and staves are assembled in operative relation.

By the use of the curved cutter arms, the chamfered cuts made are generally smooth and even, irrespective of the direction of the grain of the wood at any given point.

The motor employed is preferably one using alternating current and as shown, the cutters are driven at a ratio of one to one with the armature thereof. If desired, a frequency changer may be used in connection with said motor whereby changes in the speed thereof and, of course, changes in speed of the cutters, may be obtained.

The improved machine makes it possible to quickly and accurately chamfer the marginal edges of the larger vat bottoms. In some cases, due to the diameter of the vat bottom operated upon, there might be a relatively small slippage of the endless tread mechanism, but such a slippage is of no importance and, therefore, does not affect the operation of the machine.

The machine may be easily adjusted to operate upon vat bottoms of different thickness and may also be easily adjusted to make chamfering cuts of different radial depths merely by properly positioning the gauge rollers. The machine is also capable of use upon other kinds of bottoms, regardless of their outline, shape or size and may also be used for chamfering operation on the edges of boards, timbers and the like.

While in describing the invention, I have referred in detail to the form, arrangement and construction of the various parts thereof, the same is to be considered only in its illustrative sense, so that I do not wish to be limited thereto except as may be specifically set forth in the appended claims.

I claim as my invention:

1. A machine for chamfering the edge of a vat bottom or other work embodying therein, a support, an endless tread mounted on the support for engagement and movement upon the work operated upon, a chamfering cutter carried by the support for operative engagement with said work and disposed intermediate the longitudinal limits of the endless tread, means for driving the cutter, and means for gauging the position of the cutter in its chamfering operation on the edge of said work.

2. A machine for chamfering the edge of a vat bottom or other work embodying therein, a support, an endless tread mounted on the support for engagement and movement upon the work operated upon, a pair of chamfering cutters carried by the support for operative engagement with top and bottom marginal portions of said work and disposed intermediate the longitudinal limits of the endless tread, means on said support for driving the cutters, and means for gauging the position of the cutters in their chamfering operations on the said marginal portions of said work.

3. A machine for chamfering the edge of a vat bottom or other work embodying therein a support, means providing an arcuate endless tread for said support having an axis point substantially at the center of the work operated upon, a chamfering cutter carried by the support for operative engagement with said work, means for driving the cutter, and means for gauging the position of the cutter in its chamfering operation on the edge of said work.

4. A machine for chamfering the edge of a vat bottom or other work embodying therein, a mobile support for engagement on the work operated upon an endless tread mounted on the support, means for travelling the support, a pair of cutters carried by the support for operative engagement with top and bottom marginal portions of said work said cutters being disposed intermediate the longitudinal limits of the endless tread, and means for gauging the position of the cutters in their chamfering operations on the said marginal portions of said work.

5. A machine for chamfering the edge of a vat bottom or other work embodying therein, a support, an endless tread mounted on the support for engagement and movement upon the work operated upon, a pair of chamfering cutters carried by the support for operative engagement with opposite sides of an edge portion of said work, means for driving the cutters and travelling the support, upon its endless tread and means for gauging the position of said cutters in their chamfering operations upon said opposite sides of said edge portion of the work.

6. A machine for chamfering the edge of a vat bottom or other work embodying therein, a support, an endless tread mounted on the support for engagement and movement upon the work operated upon, a pair of chamfering cutters carried by the support for operative engagement

with opposite sides of an edge portion of said work, means carried by the support for driving the cutters and for travelling the support, upon its endless tread and means for gauging the position of the cutters in their chamfering operations upon said opposite sides of said edge portion of the work.

7. A machine for chamfering the edge of a vat bottom or other work embodying therein, a mobile support including an arcuate endless tread for engagement on and having an axis point substantially at the center of the work operated upon, a cutter carried by the support for operative engagement with the edge of said work, a source of power mounted on the support, means for driving said tread and the cutter from said source of power, and means for gauging the position of the cutter in its chamfering operation on said edge of said work.

8. A machine for chamfering the edge of a vat bottom or other work embodying therein, a mobile support including an endless arcuate tread for engagement on and having an axis point substantially at the center of the work operated upon, a cutter carried by the support for operative engagement with the edge of said work, a source of power mounted on the support, means including reduction and reverse gearing for driving said tread from said source of power, means for driving the cutter from said source of power, and means for gauging the position of the cutter in its chamfering operation upon said edge of said work.

9. A machine for chamfering the edge of a vat bottom or other work embodying therein a support, and arcuate endless traction tread for one end thereof having an axis point at substantially the center of said work, a wheel for the other end of said support, said tread and wheel being adapted for a movable engagement upon the work operated upon, a cutter carried by the support for operative engagement with the edge of said work, a source of power on said support, means for driving the tread and the cutter from said source of power, and means for gauging the operative position of the cutter in its chamfering operations upon the edge of said work.

10. A machine for chamfering the edge of a vat bottom or other work embodying therein a support, an arcuate endless tread element having its axis point at substantially the center of the work, operatively positioned with respect to one end of the support and a trailing caster wheel for the other end of the support, said tread element and wheel being adapted to engage upon the work operated upon, a cutter carried by the support for operative engagement with the edge of said work, a source of power on said support, means including speed reducing means for driving the tread from the source of power, means for driving the cutter from said source of power, and means for gauging the cutter in its chamfering operations upon the edge of said work.

11. A machine for chamfering the edge of a vat bottom or other work embodying therein, a support, an endless tread carried by the support for engagement and movement upon the work operated upon, a vertical shaft journalled in the support, top and bottom cutters mounted on said shaft and each having a cutting edge for operative engagement with top and bottom edge portions of said work, means for driving said vertical shaft, and means for gauging the position of the said cutters in their chamfering operations on the edge of said work.

12. A machine for chamfering the edge of a vat bottom or other work embodying therein, a support, an endless tread carried by the support for engagement and movement upon the work operated upon, a vertical shaft journalled in the support, top and bottom vertically spaced rotary chamfering cutters carried on said shaft for operative engagement with opposite sides of an edge portion of said work, means for adjusting the spacing between the cutters on said shaft, means for driving said vertical shaft, and means for gauging the position of the cutters in their chamfering operations upon said opposite sides of the edge of said work.

13. A machine for chamfering the edge of a vat bottom or other work embodying therein, a support, an endless tread carried by the support for engagement and movement upon the work operated upon, a cutter head carried by the support outwardly of the edge of said work operated upon, a driven shaft journalled in said head, top and bottom cutters fixed on said shaft for operative engagement with top and bottom marginal portions of said work, means for driving said shaft, and means at each side the cutter head for engaging the edge of said work for gauging the position of said cutters in their chamfering operations on said marginal portions.

14. A machine for chamfering the edge of a vat bottom or other work embodying therein a horizontally disposed support, an arcuate endless traction tread operatively engaged therewith and having an axis point substantially at the center of said work, a wheel carried by said support, a motor on said support, a vertically arranged casing at one end of said support, a cutter shaft journalled therein and driven by the motor, cutter position gauging means carried by said casing, gearing for driving the shaft from the motor, and gearing between the motor and endless traction tread for driving the same in the desired direction.

15. A machine for chamfering the edge of a vat bottom or other work embodying therein a horizontally disposed support, an arcuate endless traction tread operatively engaged therewith and having an axis point at substantially the center of said work, a wheel carried by said support, a motor on said support, a vertically arranged casing at one end of said support, a cutter shaft journalled therein and driven by the motor, a vat bottom edge engaging roller at each side of the cutter shaft, means for mounting each roller with respect to said casing whereby the same may be adjusted toward or away from the edge of the work operated upon for gauging the position of the cutter in its chamfering operation, gearing for driving said shaft from the motor, and gearing between the motor and endless traction tread for driving the same in the desired direction.

CHARLES M. E. WENDNAGEL.