

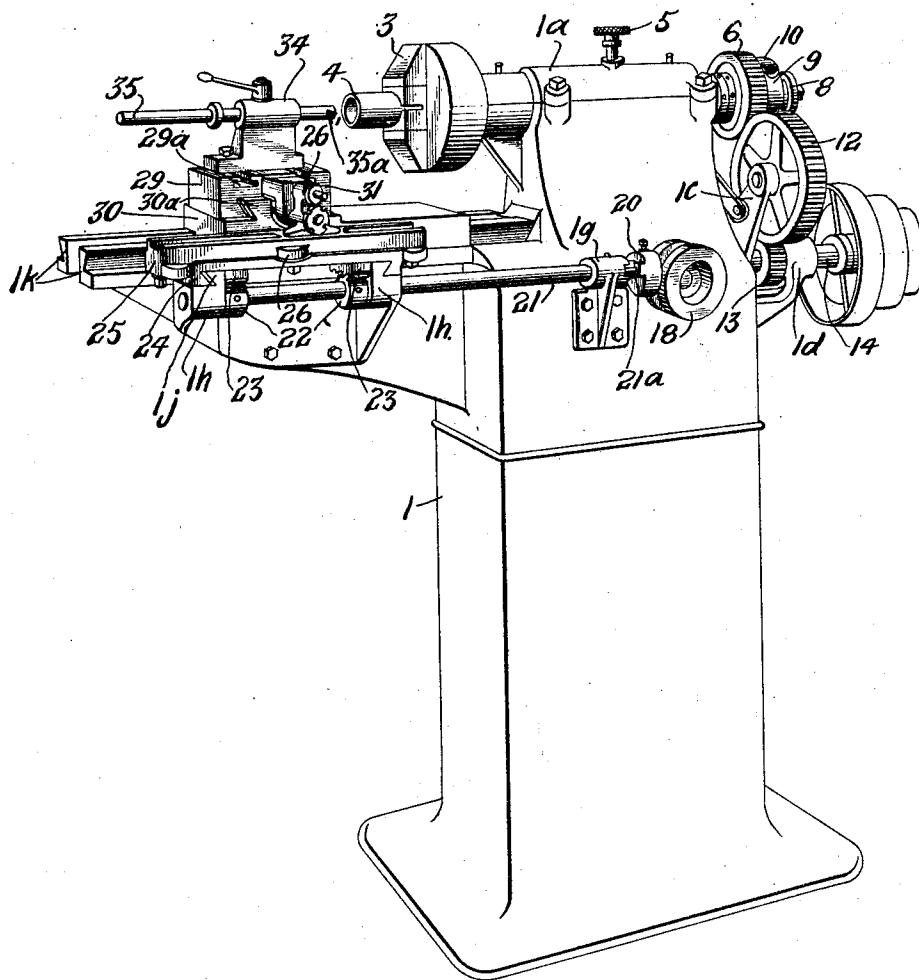
W. F. FISCHER.
MACHINE FOR FORMING GROOVES.
APPLICATION FILED JUNE 28, 1919.

1,343,554.

Patented June 15, 1920.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

Kurt H. Henglinger

INVENTOR

WILLIAM F. FISCHER.

BY

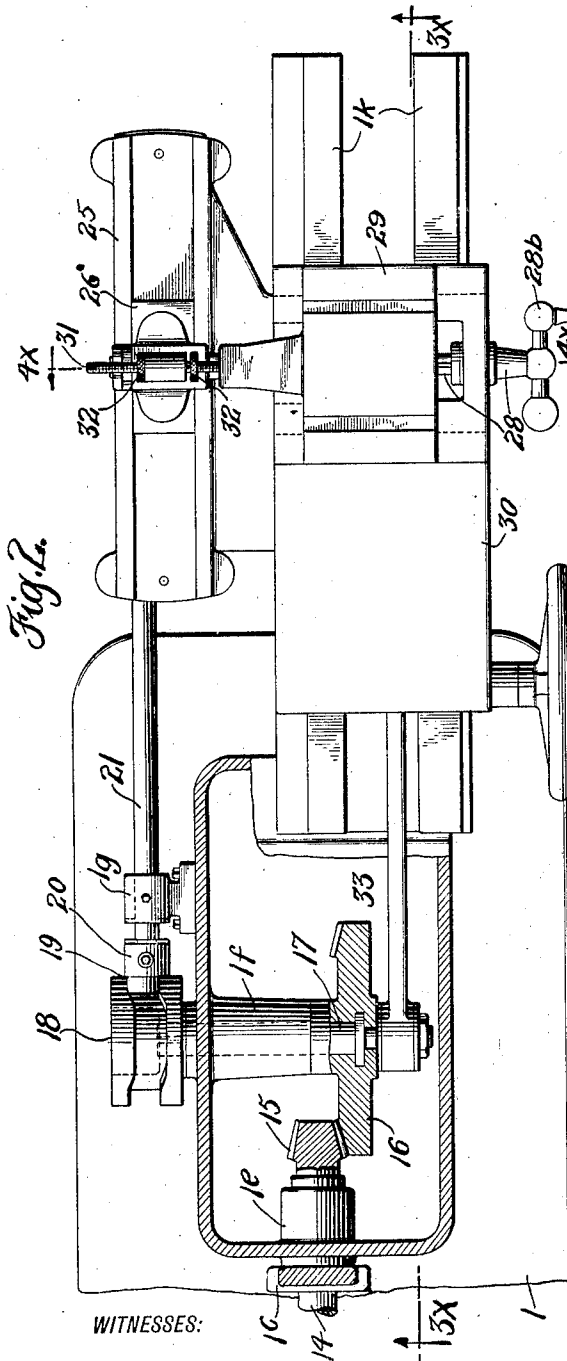
Chas. N. Butler

ATTORNEY

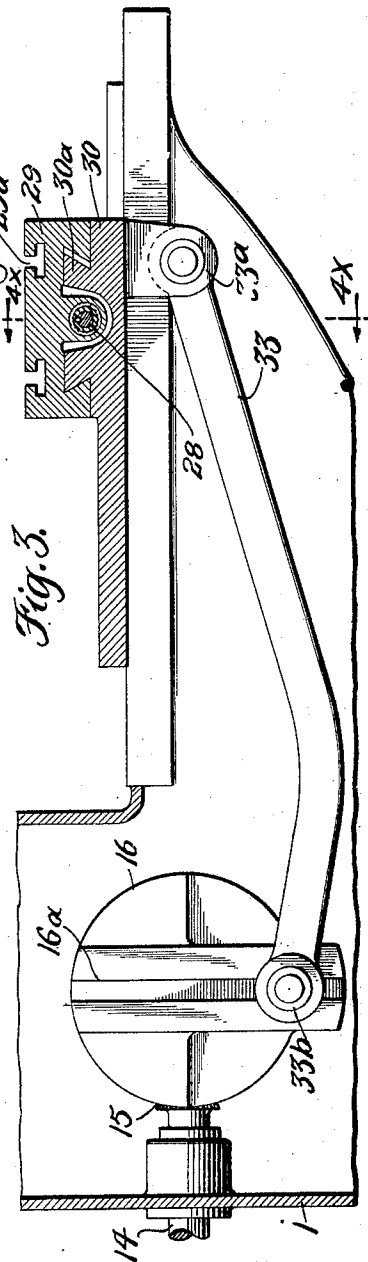
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4 SHEETS—SHEET 2.



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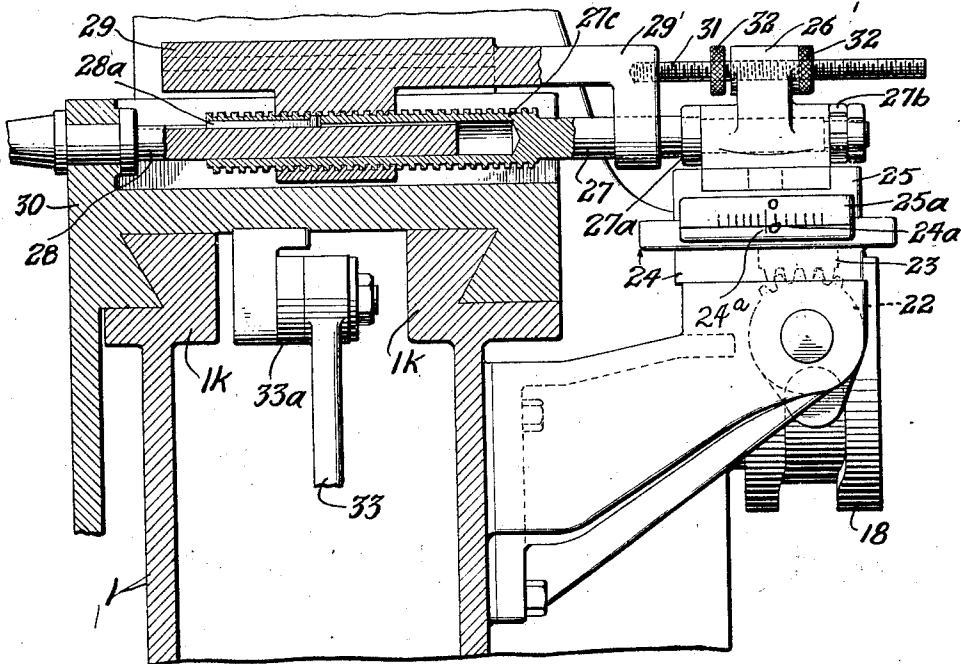


Fig. 4.

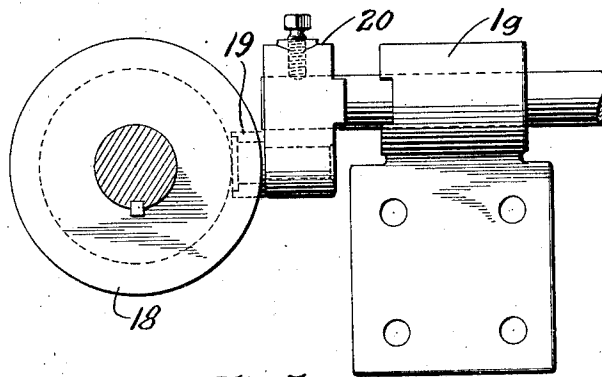


Fig. 5.

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4 SHEETS—SHEET 4.

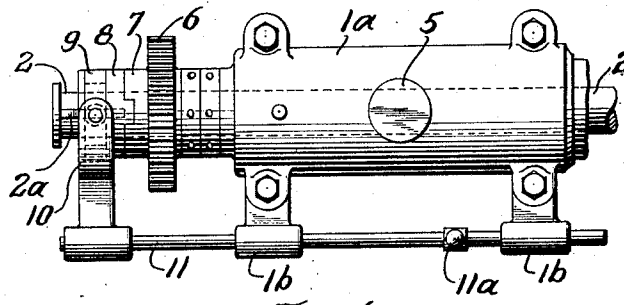


Fig. 6.

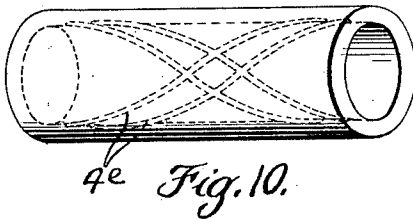


Fig. 10.

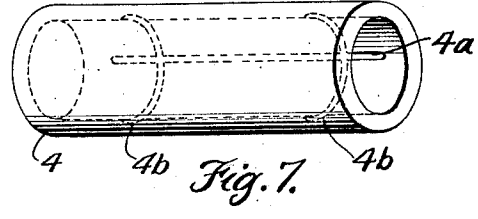


Fig. 7.

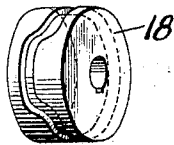


Fig. 11.

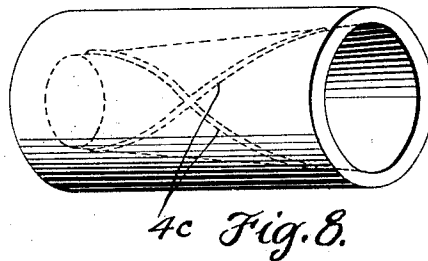


Fig. 8.

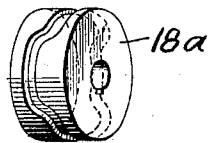


Fig. 12.

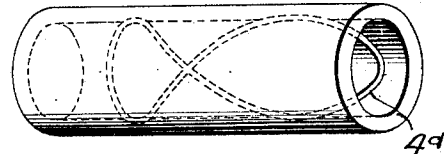


Fig. 9.

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UNITED STATES PATENT OFFICE.

WILLIAM F. FISCHER, OF PHILADELPHIA, PENNSYLVANIA.

MACHINE FOR FORMING GROOVES.

1,343,554.

Specification of Letters Patent. Patented June 15, 1920.

Application filed June 28, 1919. Serial No. 307,416.

To all whom it may concern:

Be it known that I, WILLIAM F. FISCHER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain Improvements in Machines for Forming Grooves, of which the following is a specification.

This invention is designed to provide an improved machine having the object of cutting grooves of various forms in bearings, for the purpose of holding a lubricant for said bearings and the co-acting journals.

The machine effects the desiderata of holding a bearing relatively to a co-acting tool so that the bearing can be moved relatively to the stationary tool, the tool can be moved variously under control with relation to the stationary bearing, and the bearing and tool can be moved simultaneously, to cut straight, circular or spiral grooves either continuously or interruptedly; the mechanism being adapted for varying the curvature of the groove, the length of the groove and generally the character of the groove at will.

In its preferred form, the improvements are comprised in a machine provided with a journaled chuck adapted for holding the work, mechanism for revolving or fixing said chuck at will, a post for holding a tool adapted to cut a groove in said work, and means for moving said tool parallel to the axis of revolution of the chuck, at right angles to the axis and at intermediate angles with relation thereto to effect desired results.

The characteristic features of the invention are fully disclosed in the machine set forth in the following description and the accompanying drawings in illustration thereof.

In the drawings, Figure 1 is a perspective view of the machine. Fig. 2 is a horizontal part sectional view of the same. Fig. 3 is a broken vertical sectional view on the line 3^x—3^x of Fig. 2. Fig. 4 is a broken vertical sectional view on the line 4^x—4^x of Figs. 2 and 3. Fig. 5 is a broken part sectional elevation of detached details comprising a forming cam together with coöperating means for controlling the tool. Fig. 6 is a detached top plan view of mechanism for controlling the chuck. Figs. 7, 8, 9 and 10 are perspective views of bearings provided with lubricator grooves in illustration of

types of effects produced by the mechanism, and Figs. 11 and 12 are perspective views of types of former cams used in the mechanism for producing different effects.

The machine illustrated comprises a frame (1) having a bearing (1^a) in which is journaled the spindle (2) provided with the chuck (3) holding the work (4), shown as a cylindrical bearing. A screw (5) movable in the bearing (1^a) is adapted for fixing the spindle (2) when it is desired to hold the work (4) stationary.

A pinion (6), adapted to turn on the spindle (2), has fixed thereto a clutching device (7) adapted to be engaged and disengaged by a clutching device (8) which is engaged to the spindle by a spline (2^a). The device (8) is movable along the spindle (2) by a collar (9) in which it revolves and a yoke (10) engaging the collar, the yoke being fixed to a rod (11) adapted to be reciprocated by its handle (11^a) in the bearings (1^b).

An idler gear (12), journaled on the adjustable bearing (1^c), revolves the pinion (6) and is revolved by a pinion (13) fixed on the driving shaft (14), which is journaled in the bearings (1^d) and (1^e).

A beveled pinion (15), fixed on the inner end of the driving shaft (14), engages a beveled gear (16) fixed on a shaft (17) which is journaled in the bearing (1^f), the shaft (17) having a peripherally grooved cam (18) detachably connected therewith so that different cams as (18^a) may be substituted therefor as required by the work to be done.

A stud or roller (19) is disposed eccentrically on a clutching device (20) which is movable along a shaft (21) journaled in the bearings (1^g) and (1^h), being engaged to the shaft by the spline (21^a). The stud or roller (19) is adapted to be engaged in the cam (18) to turn the shaft (21) or to be disengaged therefrom when the clutching device is moved into clutching engagement with the clutch bearing (1^g), whereby the shaft (21) is held stationary.

Gears (22) fixed on the shaft (21) engage the racks (23) fixed on the slide (24) which is movable along the guides (1ⁱ) transversely to the shaft. A guide (25) is connected in oscillatory relation to the slide (24) by the arbor (26), this guide having a scale (25^a) on an end thereof co-acting with the index

(24^a) on the slide (24) for setting the guide with reference to the slide. A slide (26') is movable in the guide (25) and has journaled therein a shaft (27) to which it is engaged by the collars (27^a) and (27^b). This shaft (27) has a hollow threaded section (27^c), which is movable longitudinally on the shaft (28) connected thereto by a spline (28^a) and makes a threaded engagement with the slide (29). The shaft (28) is journaled in a slide (30) provided with transverse ways (30^a) for controlling the movement of the slide (29) which is carried thereby, the shaft being provided with a handle (28^b) for turning it to revolve the shaft (27) and adjust the slide (29).

A threaded rod (31) is fixed to the slide (29) by its bent arm (29') through which the shaft (27) passes, the rod being engaged by the nuts (32) adjustable thereon in movable relation to the slide (26).

The slide (30) is movable along the ways (1^k) by a link (33) having a pivotal connection (33^a) therewith and an adjustable pivotal connection (33^b) with the wheel (16). The wheel has a diametral way (16^a) in which the connection (33^b) is adapted to be set at the desired distance from the wheel's center of rotation, to effect the desired reciprocation of the slide (30) or permit it to remain stationary.

A tool post (34) is fixed in laterally adjustable relation upon the slide (29) having the transverse ways (29^a) therein, the post holding adjustably the tool (35) provided with a cutter (35^a) adapted to act in the bearing (14) to form a groove therein.

In the operation of the machine, when it is desired to cut a straight longitudinal groove (4^a) in the cylindrical bearing (4) as illustrated in Fig. 7, the clutching device (8) is held out of engagement with the clutching device (7) so that the pinion (6) shall be free on the spindle (2) which is now fixed in its bearing (1^a) by means of the screw (5), and the clutching device (20) is moved into engagement with the clutching device (1^s) so that the eccentric (19) is disengaged from the cam (18) and the shaft (21) is fixed in position. The driving shaft (14) now acts through the beveled gears (15) and (16) effectively on the link (33) only, and the link moves the slide (30) along the ways (1^k). The slide carries the relatively fixed parts (29), (34) and (35) so that the cutter (35^a) acts in a straight line along the groove (4^a) parallel to the axis of the bearing (4); the zero point of the scale (25^a) having been set in registration with the index (24^a) so that the way (25) is parallel with the ways (1^k), and the device (33^b) having been set in the relation to the center of rotation of the wheel (16) for effecting the movement of the slide corresponding to the length of the groove desired. The tool (35^a) is ad-

justed laterally to engage the work by turning the handle (28^b), the parts (32) being properly set.

In forming the circular grooves (4^b) in the bearing (4) as shown in Fig. 7, the connection (33^b) is fixed at the center of the wheel (16) so that no motion will be communicated through the link (33) to the slide (30), and the tool (35) is set in the post (34) so that the cutter (35^a) will engage the interior of the bearing (4) at the desired point for cutting the particular groove, the slide (29) being adjusted laterally on the slide (30) by turning the handle (28^b) to bring the cutter (35^a) into contact with the bearing (4) and the nuts (32) being adjusted to permit the further movement of the tool corresponding to the depth to be cut. The clutch member (8) is now operated to fix the pinion (6) to the spindle (2), the eccentric (19) being engaged with the cam (18). The driving shaft (14) now acts through the gears (13), (12) and (6) to turn the spindle (2), the bearing (4) being turned thereby in contact with the cutter (35^a). At the same time the cam (18) acts through the eccentric (19) and member (20) on the shaft (21) which acts through the gears (22) on the racks (25) whereby the slide (24) is shifted laterally to disengage and reengage the tool with relation to the work at the desired limits of the groove.

In forming the spiral grooves (4^c) in the tapered bushing shown in Fig. 8, the guide (25) is set so that it will be parallel to the desired line of movement of the cutter (35^a). The pitch and length of the grooves will be determined by the size of the wheel (12) inserted in the machine, to regulate the rate of revolution of the work; the point at which the connection (33^b) is set with reference to the center of the wheel (16), to regulate the stroke of the tool, and the character of the cam (18^a) engaged with the eccentric (19) which shifts the tool laterally to engage and disengage the work.

In forming the continuous spiral groove (4^d) in the bushing shown in Fig. 9, the clutch member (20) is engaged with the clutch member (1^s), which disengages the eccentric (19) from the cam (18^a) so that the tool (35^a) remains in the same lateral position with relation to the slide (30) as the work is revolved in contact therewith, the way (25) being set parallel to the axis of a cylindrical bushing and at an angle to the axis of a tapered bushing as described.

In cutting the grooves (4^e) as illustrated in Fig. 10, the operation described in connection with Fig. 8 is repeated after disengaging the clutch member 8 and adjusting the shaft (2) through a half turn.

It will be understood that the machine is adapted for cutting external as well as internal grooves.

Having described my invention, I claim:—

1. In a machine of the character described, the combination of a journaled spindle having means for holding work, driving mechanism, means for engaging and disengaging said spindle with relation to said driving mechanism, a cutting tool, means whereby said driving mechanism reciprocates said cutting tool in contact with the work held by said spindle, and means whereby said driving mechanism reciprocates said cutting tool to engage and disengage it periodically with relation to said work.
2. In a machine of the character described, the combination with a cutting tool and a work holder, of adjustable automatic means for reciprocating said tool through variable predetermined distances, means whereby said work holder can be revolved or held stationary with relation to the moving tool, and automatic means for reciprocating said tool transversely to the line cut thereby to effect its engagement and disengagement with relation to the work.
3. In a machine of the character described, the combination with a cutting tool and a work holder, of means for reciprocating said tool in contact with work engaged by said holder to form a sectional groove in said work, manually operated means for moving said tool into and out of engagement with said work and automatically operated means for throwing said tool into and out of engagement with the work at predetermined points in its cutting operation so as to form a sectional groove.
4. In a machine of the character described, the combination with a reciprocatory cutting tool and a revoluble work holder, of driving means for revolving said holder, manually operated means adapted for moving said tool into and out of engagement with the work, and mechanism comprising a cam and a shaft revolved thereby whereby said driving means throws said tool out of engagement with the work at a predetermined point in its cutting operation.
5. In a machine of the character described, the combination of a driving shaft, a journaled work holder, means for engaging and disengaging said holder with relation to said shaft, means for fixing the disengaged holder, a cutting tool, a reciprocatory slide for carrying said tool in contact with work engaged by said holder, a link for reciprocating said slide, a wheel having means for connecting said link therewith at variable distances from its axis, and means whereby said shaft revolves said wheel.
6. In a machine of the character described, the combination of a driving shaft, a work holder comprising a journaled spindle, means for engaging and disengaging said spindle with relation to said shaft, means for fixing said spindle when disengaged from said shaft, a reciprocatory slide, a link for reciprocating said slide, a wheel having means for connecting said link therewith at variable distances from its axis, means whereby said shaft revolves said wheel to operate said link and reciprocate said slide, a slide adapted to reciprocate on said slide first named transversely to its line of reciprocation, means comprising a tool carried by said slide second named, and means for reciprocating said slide second named on said slide first named.
7. In a machine of the character described, the combination of a work holding device, a cutting device adapted to act upon work engaged by said holding device, means for moving one of said devices with relation to the other for effecting the cutting operation, manually operated means for adjusting said cutting device with relation to the work, and automatically operated means comprising a cam and mechanism revolved thereby for throwing said cutting device into and out of engagement with the work.
8. In a machine of the character described, the combination with a journaled work holding device and a reciprocatory cutting device, of means for revolving the work holding device and reciprocating the cutting device simultaneously to cut spiral grooves in work held by said holder, and automatically operated means for reciprocating said cutting device transversely to its cutting movement to effect its engagement and disengagement with the work during the continuous revolution of the work holding device.
9. In a machine of the character described, the combination of driving means, a journaled work holder, a reciprocatory cutting tool, mechanism whereby said driving means moves said tool in contact with work engaged by said holder and revolves said holder with the work in contact with said tool, and mechanism operated by said driving means for reciprocating said tool transversely to its cutting movement to engage and disengage it with relation to the work, said mechanism last named comprising a journaled shaft, a cam connecting said shaft with said driving means and a reciprocatory slide operated by said shaft.
10. In a machine of the character described, the combination of a cutting device, a work holding device, means for moving one of said devices with relation to the other to effect the cutting operation, and means for throwing said cutting device out of engagement with the work, said means last named comprising a journaled shaft, means for rocking said shaft, a slide and means whereby said shaft operates said slide.
11. In a machine of the character described, the combination of a cutting device, a work holding device, means for moving

- one of said devices with relation to the other to effect the cutting operation, and means for throwing said cutting device into and out of engagement with the work, said means last named comprising a journaled shaft, mechanism comprising a cam for rocking said shaft, a slide, and mechanism comprising a gear and rack whereby said shaft reciprocates said slide.
12. In a machine of the character described, the combination of a work holding device, a cutting device, means for moving said work holding device with relation to said cutting device and means for moving said cutting device with relation to said work holding device, said means last named comprising a slide on which said cutting device is carried, a second slide, means whereby said slide first named is connected in adjustable relation to said slide second named, a journaled shaft, and means comprising a rack and gear whereby said slide second named is reciprocated by said shaft to reciprocate said slide first named.
13. In a machine of the character described, the combination of a work holding device, a cutting device, and means for moving said cutting device with relation to work engaged by said holding device, said means comprising a slide by which said cutting device is movable into and out of engagement with the work, a second slide, means for connecting said slides in variable relation, an oscillatory guide along which said second slide is movable, a third slide by which said guide is carried, and means for reciprocating said third slide.
14. In a machine of the character described, the combination of a tool, means comprising a slide and way whereby said tool is movable, a second slide and a way therefor transverse to said way first named, and means for operating said slide first named under control of said slide second named, said last named means comprising a hollow shaft having a threaded connection with said slide first named and a journaled connection with said slide second named, a journaled shaft extending into said hollow shaft and means whereby said journaled shaft revolves said hollow shaft and said hollow shaft is movable longitudinally on said journaled shaft.
15. In a machine of the character described, the combination of a work holder, a reciprocatory slide, a reciprocatory slide movable transversely to said slide first named, a tool carried by said slide second named, a slide coupled to said slide second named, a guide for controlling the movement of said slide third named, means for adjusting said guide angularly and means for reciprocating said guide.
16. In a machine of the character described, the combination of a journaled work holder, a slide adapted to reciprocate parallel to the axis of said work holder, a slide adapted to reciprocate on said slide first named transversely to its direction of its movement, a tool carried by said slide second named, an oscillatory guide adapted to be set at different angular relations to the axis of said work holder, a slide movable under control of said guide, means for coupling said second and third slides together, and means for reciprocating said guide.
17. In a machine of the character described, a frame having a way, a slide adapted to reciprocate along said way, a slide adapted to reciprocate on said slide first named transversely to said way, a tool carried by said slide second named, an oscillatory guide adapted to be fixed at different angular relations to said way, a reciprocatory slide movable along said guide, and a shaft journaled in said slide third named and having a threaded connection with said slide second named.
18. In a machine of the character described, a frame having a way, a slide adapted to reciprocate along said way, a slide movable on said slide first named transversely to said way, a guide adapted to be set at different angular relations to said way, a slide movable along said way, and a revoluble shaft having a screw threaded connection with said slide second named and a journaled connection with said slide third named.
19. In a machine of the character described, a frame having a way, a slide adapted to reciprocate along said way, a slide movable on said slide first named transversely to said way, a guide adapted to be set at different angular relations to said way, a slide movable along said guide, means for coupling said slides second and third named, means for shifting said guide so as to shift said second and third named slides and means for reciprocating said guide.
20. In a machine of the character described, a frame having a way, a slide adapted to reciprocate along said way, adjustable driving mechanism for reciprocating said slide through variable predetermined distances along said way, a slide movable on said slide first named transversely to said way, means for manually adjusting said slide second named, a way transverse to said way first named, a slide movable along said way second named, a guide adjustable on said slide third named, a slide movable along said guide, and an adjustable coupling connecting said second and fourth named slides.
21. In a machine of the character described, a frame having a way, a slide movable along said way, mechanism for reciprocating said slide, a slide movable on said slide first named transversely to said way,

a tool carried by said slide second named, means for manually adjusting said slide second named, a way transverse to said way first named, a slide movable along said way second named, a guide adapted to be adjusted on and to be reciprocated by said slide third named, means for coupling said second and fourth named slides together, and means whereby said slide third named is operated in synchronous relation with said slide first 10 named.

In testimony whereof I have hereunto set my name this 27th day of June, 1919.

WILLIAM F. FISCHER.