No. 804,706. PATENTED NOV. 14, 1905.

L. COES.

CONTINUOUS MILLING MACHINE.

APPLICATION FILED JAN. 30, 1905.

4 SHEETS—SHEET 1.

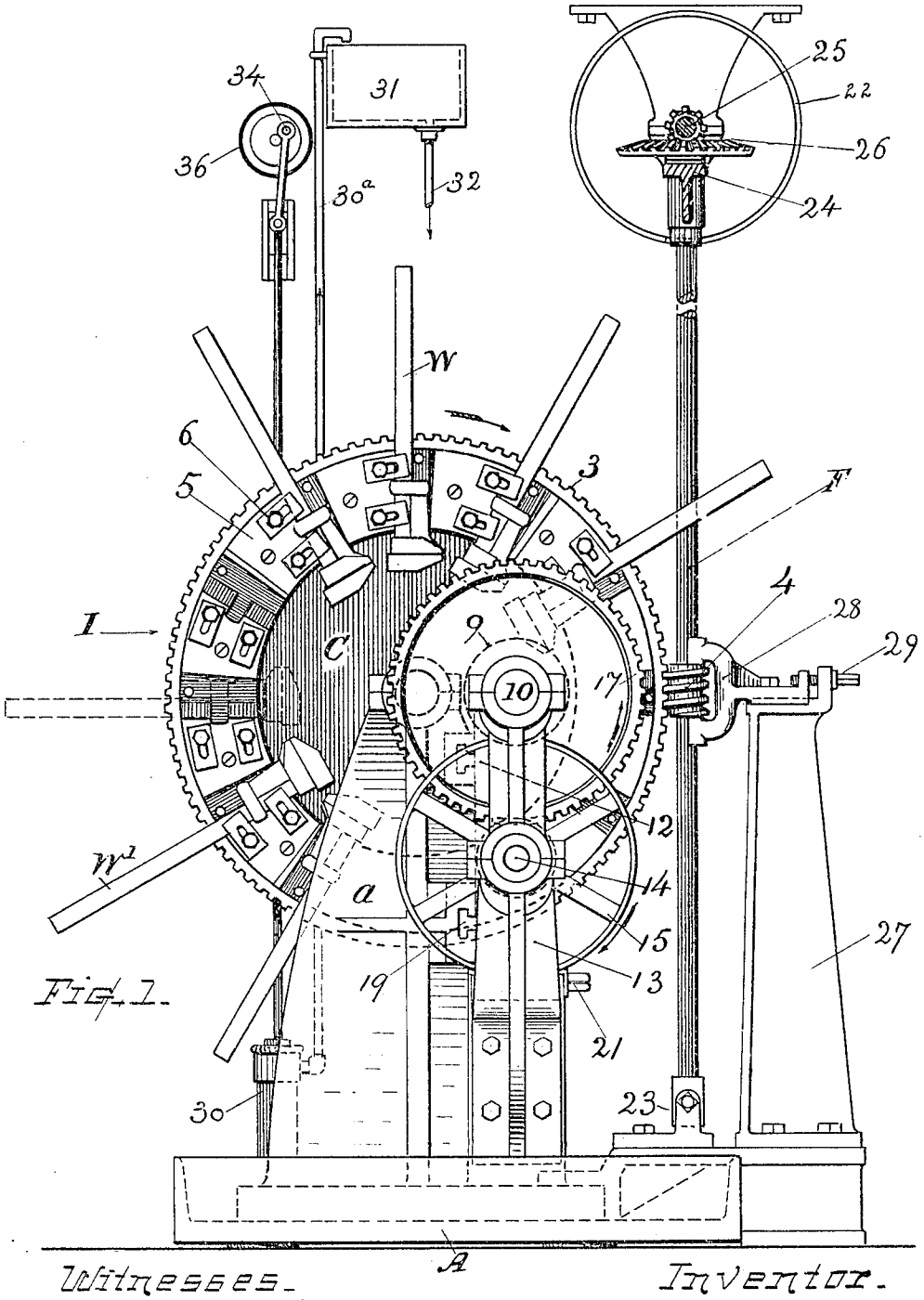

Fig. 1.

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4 SHEETS—SHEET 2.

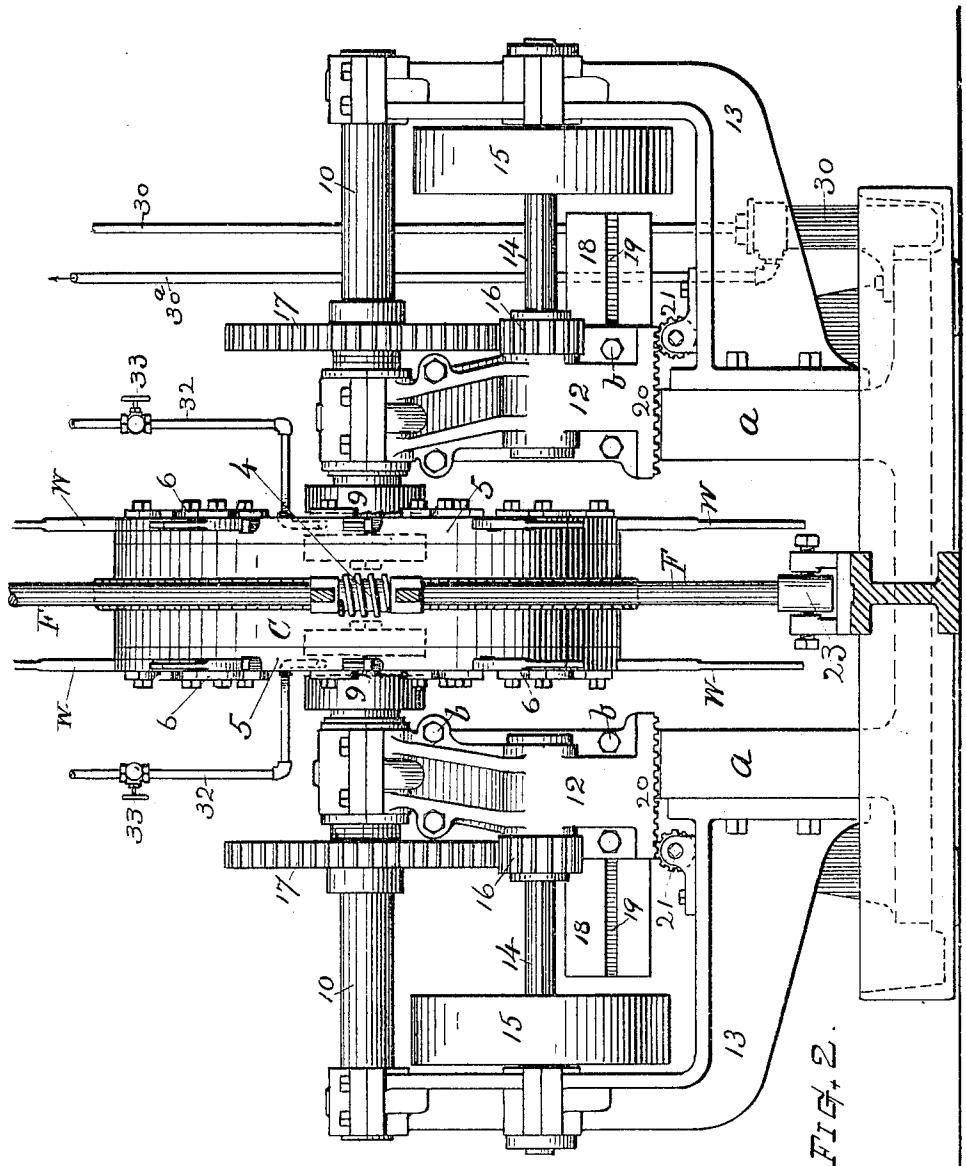

FIG. 2.

Witnesses.
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4 SHEETS—SHEET 3.

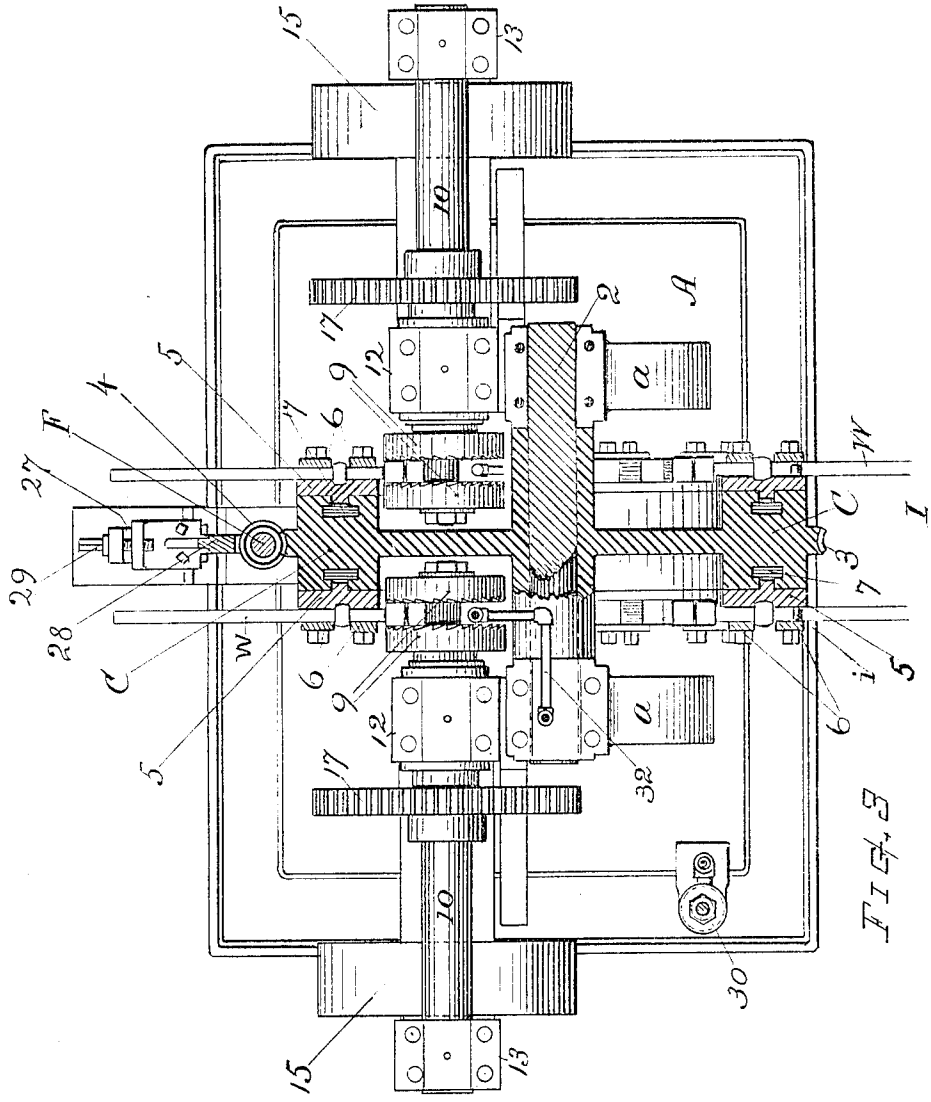

FIG. 3

Witnesses.
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4 SHEETS—SHEET 4.

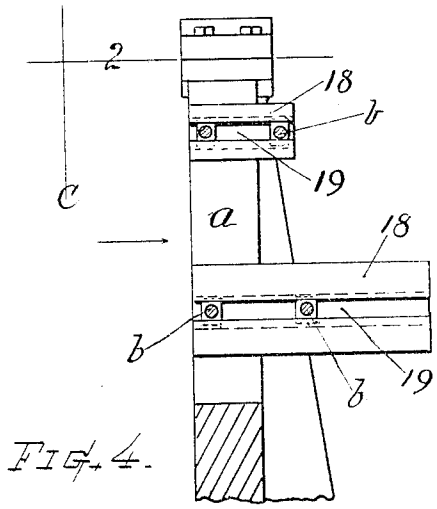

FIG. 4.

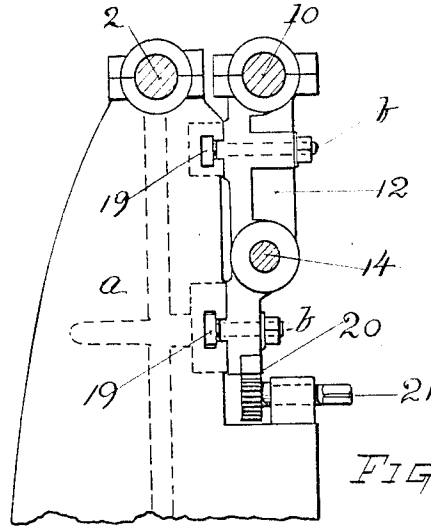

FIG. 5.

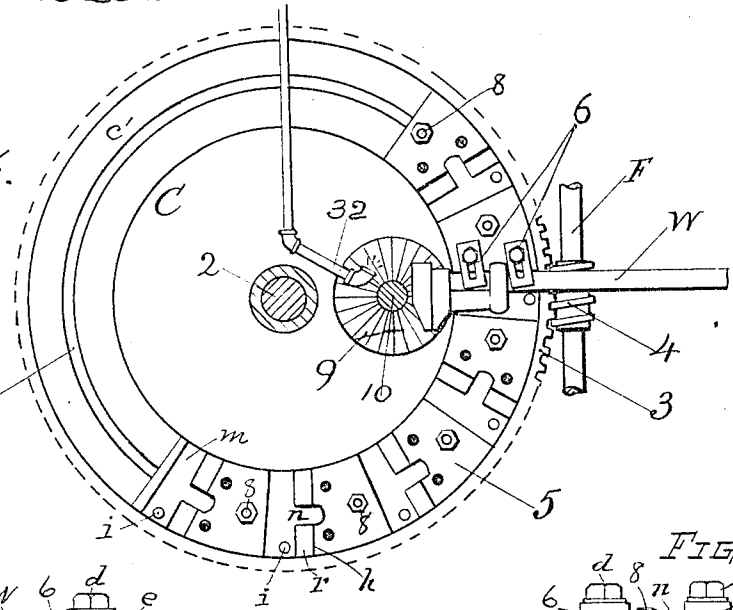

FIG. 6.

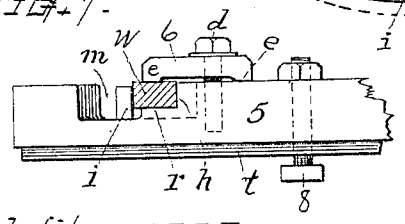

FIG. 7.

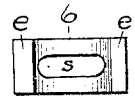

FIG. 9.

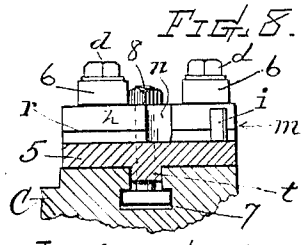

FIG. 8.

Witnesses.

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UNITED STATES PATENT OFFICE.

LORING COES, OF WORCESTER, MASSACHUSETTS.

CONTINUOUS MILLING-MACHINE.

No. 804,706. Specification of Letters Patent. Patented Nov. 14, 1905.

Application filed January 30, 1905. Serial No. 243,221.

To all whom it may concern:

Be it known that I, LORING COES, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Continuous Milling-Machine, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

The prime object of my present invention is to provide a practically efficient and convenient mechanism adapted for milling the heads and jaws of wrenches and other analogous class of work quickly, accurately, and economically and adapted for a continuous operation, as hereinafter more fully explained.

Another object is to provide a milling-machine of the character specified having a dual-faced carrier-disk wheel, in combination with a plurality of milling-tool operators, whereby the mechanism is adapted for simultaneous operation at the opposite faces of the disk upon two lines of work.

Minor objects and features of my invention are pointed out and explained in the following detailed description, the particular subject-matter claimed being hereinafter definitely specified.

In the accompanying drawings, Figure 1 represents an end view of a mechanism embodying my invention. Fig. 2 is a rear view of the same. Fig. 3 is a plan view with some of the parts shown in horizontal section. Figs. 4 and 5 are fragmentary views showing the manner of connecting the adjusting bearing-head with the main standing frame. Fig. 6 is a diagrammatic view of the carrier, milling-cutters, &c. Fig. 7 is a front detail view of the work-holding device. Fig. 8 is a transverse section of the segmental rim-plate or vise-section, and Fig. 9 is a bottom view of one of the clamp-pieces.

The mechanism embodying my invention comprises a circular work-supporting carrier supported on an axial shaft that is rotatable in suitable bearings on the main uprights or standing frames. The periphery of the carrier is provided with a toothed or worm-gear flange fixed to or formed integral thereon, the teeth of which mesh with a driving-gear or worm-screw mounted on a rotatable shaft, and by means of which worm-gearing the carrier is revolved with a steady powerful movement for feeding the work to the milling tools or cutters, which latter are mounted upon the ends of rotatable arbors and located adjacent to the rim of the carrier, either within or without the circle thereof. The milling-arbors are rotated independently by gearing from belt-driven operating-shafts. The wrenches or articles to be milled are clamped to the carrier-faces and passed between the milling-cutters by the revolution of the carrier, the attendant changing the milled work for unmilled articles as they arrive at a front position.

In referring to the drawings, C indicates the carrier, mounted on the shaft 2, which is rotatable in bearings on the main upright frames *a*, that stand upon the bed A. This carrier consists of a disk wheel, dual-faced and provided with the peripheral worm-gear 3 for meshing with the worm 4 on the feed-shaft F and with annular rim-faces *c'*, each having therein a circular undercut T-groove 7. Firmly mounted upon the carrier-disk rim on each of its lateral faces there is provided removable segments or annulus-sections 5, formed with a series of seats or matrices for supporting the wrenches or work W, and there are also provided clamping devices 6, by which the work can be securely fixed in position thereon and released, as occasion may require.

The preferred construction of the vise plate or section 5 is best shown in Figs. 6, 7, and 8. A cavity or matrix *m* is formed in the plate 5, with a space *n* to accommodate the wrench-jaw strap and a flat seat *r* and shoulder *h*, against which the flat side and angle of the wrench-bar W can rest. A guard-pin *i* is erected in the cavity to keep the wrench-bar back against the shoulder. The clamp devices 6 consist of slotted pieces (see Fig. 9) having bearing-faces *e* on the under side adjacent to its ends. Said pieces are attached to the segmental plate 5 in pairs, each by a bolt *d*, passing through the slot *s* and threaded into the plate in such manner that the end of the piece can be clamped down upon the wrench-bar, as in Fig. 7, or when the screw or bolt *d* is loosened the piece can be slipped back to release the wrench-bar without detaching the clamp-piece from the plate 5.

The vise-sections can be formed as segments of any convenient parts of the circle. They are retained on the carrier by a counter-matching rib *t* and T-headed bolts 8, that en-

gage with the T-groove 7, as shown in section Fig. 8. The wrenches or articles to be milled are held with their heads projecting inward toward the axis and flatwise with the plane of the carrier. These vise-sections 5 can be taken from the carrier-wheel and replaced by others having matrices, seats, or clamping means adapted for supporting wrenches or articles of different size or shape.

The milling-cutters 9 and the cutter-operating mechanisms at the right and the left of the carrier are in the instance shown made of similar construction, but in right and left order. A description of one set will apply to either. The arbor 10, carrying the milling-cutters 9, is mounted to rotate in bearings respectively disposed on a bearing-head 12 and on a projecting arm 13 of the frame. Below the arbor 10 and parallel therewith there is an operating-shaft 14, having a pulley 15 keyed thereon and also a pinion 16, that meshes with a gear 17, fixed on the milling-tool arbor. The inner end of the arbor 10 is fitted for supporting and rotating the milling-cutters and provided with means, as a clamp-nut, for securing them rigidly thereon.

The bearing-head 12 is adjustably connected with the main frame in a manner to adjust laterally thereon by suitable countermatching seating-surfaces 18 and T-grooves 19 for the heads of the attaching-bolts, and a rack 20 and pinion 21 or other suitable devices are provided for shifting the position of the bearing-head. As best shown in Fig. 2, the toothed rack is arranged on the bearing-head, and the rotatable pinion having a key-stem or means for turning it is mounted in connection with the frame.

When the attaching-bolts *b* are loosened, the bearing-head 12, together with the arbor 10, gears 17, shaft 14, and milling-cutters 9, can by the aid of a key or wrench on the pinion-stem be moved laterally away from the carrier, so as to facilitate the adjustment, removal, and changing of the milling cutters or tools at the inner end of the arbor. When such movement is effected, the arbor 10 and shaft 14 slide endwise through the outer bearings, the shaft also sliding in the hub of its pulley 15, said pulley being arranged upon its shaft with a spline that engages a longitudinal groove in the shaft.

The feed-shaft F, carrying the worm-screw 4, is journaled in a step-bearing 23 and an upper bearing or hanger 24, in which is also supported a counter-shaft 25, and suitable bevel-gears 26 are provided for transmitting power and motion from the counter-shaft to the feed-shaft. At the back of the feed-shaft there is a rigid upright standard 27, fixed to the bed and having thereon at its upper end an adjustable brace-bearing 28, that rests against the feed-shaft adjacent to the worm-screw 4 for keeping the same firmly in mesh with the carrier-flange. The degree of pressure of said brace-bearing can be regulated by means of a screw 29, arranged at the back of said bearing, as indicated on Fig. 1.

The bed-frame A is best formed as a basin with a channel for catching the lubricating liquid and a pump 30, provided for raising said liquid from the channel in the bed to a reservoir 31, arranged overhead and from which a pipe or pipes 32 extend for delivering a stream of such liquid to the milling-cutters while they are in operation. The delivery-opening of the pipes 32 is preferably upward between the pairs of milling-cutters 9. (See Figs. 2 and 6.) Suitable stop-cocks 33 are arranged in the pipes for regulating the quantity of lubricating liquid delivered therethrough. The pump may be operated by any suitable means—as, for instance, a revolving crank 34 on a shaft having a pulley 36 for its rotation.

The motive power for operating the mechanism may be transmitted from any suitable source by belts running on the pulleys 15, 22, and 36 or by such means as may in any particular instance be convenient or desired.

Preparatory to milling the headed wrench-bar and its sliding jaw are assembled, as indicated, so as to be both milled by one operation.

In the operation the milling-cutters 9 being in rapid action and the carrier C slowly revolving in the direction indicated by arrow on Fig. 1 then the attendant at the front of the machine introduces the wrenches or articles W to be milled into the vise-plate seats at the position I and clamps them in position, first removing the finished work W′, if such is contained therein. The movement of the carrier C continuously brings the several wrenches to the milling-cutters and passes them in consecutive order between the pair of cutters 9, thereby simultaneously milling off the two opposite sides of the two wrench-jaws in a uniform and efficient manner and also operating upon two series of articles at the same time, one series on the right and one on the left side of the carrier-rim. The machine operates continuously, as the removal and introduction of the work is performed without stopping the carrier.

The machine as herein illustrated and preferably is made with a dual-faced carrier and two sets of milling appliances for simultaneously operating upon two series of wrenches; but it is obvious that my invention is in like manner applicable in a machine wherein the carrier is made with but a single face or for carrying and milling only a single series of wrenches.

I am aware that differently-constructed revoluble devices have been employed in milling-machines for holding and advancing work to milling cutters or tools, and I do not, therefore, claim the broad idea of revolubility in an appliance for such purpose nor the operation of such devices by means of a worm-gearing

irrespective of the construction and mode of combination of the mechanism.

I claim as my invention—

1. In a milling-machine, the combination of a rotary carrier having a laterally-projecting annular rim, means upon the rim of said carrier for clamping and supporting wrench members with their heads projecting inward toward the central axis, and flatwise with the plane of the carrier-disk, and the oppositely-facing pair of milling-cutters disposed for operation within the circle of the carrier-rim, arranged to simultaneously mill off the opposite sides of said wrench members, as set forth.

2. In a milling-machine, a rotary carrier consisting of a disk wheel having an annular rim extending parallel with the axis and on both sides of the disk, and provided with means for holding a series of wrenches or the like, upon each of its lateral faces; in combination with an independently-operated set of milling-cutters for each series of wrench-holding means.

3. In a machine for the purpose specified, a dual-faced carrier-wheel consisting of a centrally-axled disk having oppositely-projecting rims parallel with the axis, with annular rim-faces on both sides of the disk, means upon each rim-face of said wheel for supporting and clamping a series of wrench-bars, or similar articles, a plurality of sets of independently-operated milling-cutters, and cutter-supporting arbors respectively disposed at the opposite sides of said carrier-wheel, the cutters spaced apart and the inner one of each set disposed within the plane of the carrier-rim, means for rotating said milling-cutters, and means for revolving said carrier.

4. In a continuous milling-machine, a rotary work-supporting carrier comprising a single disk wheel centrally mounted upon axles that project at its opposite sides, and provided upon each of its two faces with work-supporting annulus-sections, and means for holding and releasing the work thereon; in combination, with right and left operating milling-cutters arranged to operate in pairs at the respective sides of said carrier and positioned between the inner circle of said annulus-sections and the carrier-axles in alinement with said work-holding devices.

5. A milling-machine comprising, in combination as described, the upright main-frame stands, with the right and left rigidly-extended bearing-arms, the laterally-adjustable bearing-heads mounted on said stands in line with said arms, a rotatable carrier-disk having a lateral annular-faced rim on each side thereof, and a central peripheral gear-flange, said carrier-disk mounted between the upright stands with its axial shaft journaled in bearings thereon, the removable annulus-segments, provided with work-supporting seats and clamping devices, detachably secured upon said rim-faces, right and left milling-arbors and parallel operating-shafts, respectively journaled in bearings on said arms and on said bearing-heads, milling-cutters supported upon the ends of the arbors adjacent to the carrier-disk rims, a drive-pulley on each operating-shaft, intermeshing gears connecting the respective operating-shafts and arbors, and the feed-shaft and worm-screw for rotating said carrier-disk.

6. In a milling-machine of the character described, the combination with a rotary carrier-wheel having the annular T-grooved seating-surfaces on the sides of its rim; of removable annulus-segments seated thereon and provided with ribs that engage the groove, and detachably secured to said carrier, said segments being provided with matrices for receiving and supporting wrench members or the like, and means for temporarily clamping the same in position thereon; said annulus-segments being interchangeable for adapting the carrier to work of varied sizes and shapes.

7. In a continuous milling-machine, the combination, of a rotary carrier having a laterally-overhanging rim, means upon the side of the rim for receiving wrench members or the like, rotatable milling-cutters disposed within the inner circle of the carrier-rim, an arbor for said milling-cutters, supporting-bearings therefor, and means for effecting lateral adjustment of the arbor and milling-cutters in relation to the plane of the carrier.

8. In a continuous milling-machine, the combination as described, of the rotary carrier having a laterally-overhanging rim, its axial shaft, the upright supporting-frames therefor having the lateral arm 13 and grooved seat-faces 18, means, substantially as shown, upon the side of the carrier-rim for receiving and holding wrench members or the like, the rotatable milling-cutters disposed for operating at the inner circle of the carrier-rim, an arbor for said milling-cutters, an operating-shaft parallel therewith, said cutter-arbor and operating-shaft having their outer ends supported on the lateral arm 13, connecting-gears on said arbor and shaft, the bearing-head 12 provided with bearings for the inner ends of both the arbor and operating-shaft, means confining the arbor and shaft endwise in said bearings, said bearing-head adjustably mounted on said seat-faces on the carrier-supporting frame and movable toward and from the carrier-disk, means for effecting adjustment of said bearing-head, and means for rigidly securing the same at adjusted positions.

9. In a machine of the character described, in combination with the rotatable carrier having the annular grooved rim-face; the annular segment work-supporting plates provided with a succession of radially-disposed work-holding devices, each comprising a flatwise seat and angle for seating a wrench-bar thereon, a cavity for the wrench-jaw strap, a guard pin or lug adjacent to the end of the seat, ad-

justable slotted clamp-pieces adapted to rest upon the outer face of the bar, each having a clamp-screw passing through its slot and threaded into the plate, substantially as set forth.

10. In a milling-machine of the character described, the combination with the rotary work-supporting carrier having a peripheral worm-gear, and the upright feed-shaft provided with a worm-screw meshing with said worm-gear, as shown; of the back standard 27 rigidly fixed to the base and having the brace-bearing 28 adjustably supported on the upper part of said standard and resting against said feed-shaft adjacent to the worm-screw; and means 29 for regulating said bearing, substantially as set forth.

Witness my hand this 27th day of January, 1905.

LORING COES.

Witnesses:
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FREDERICK SEARLE.