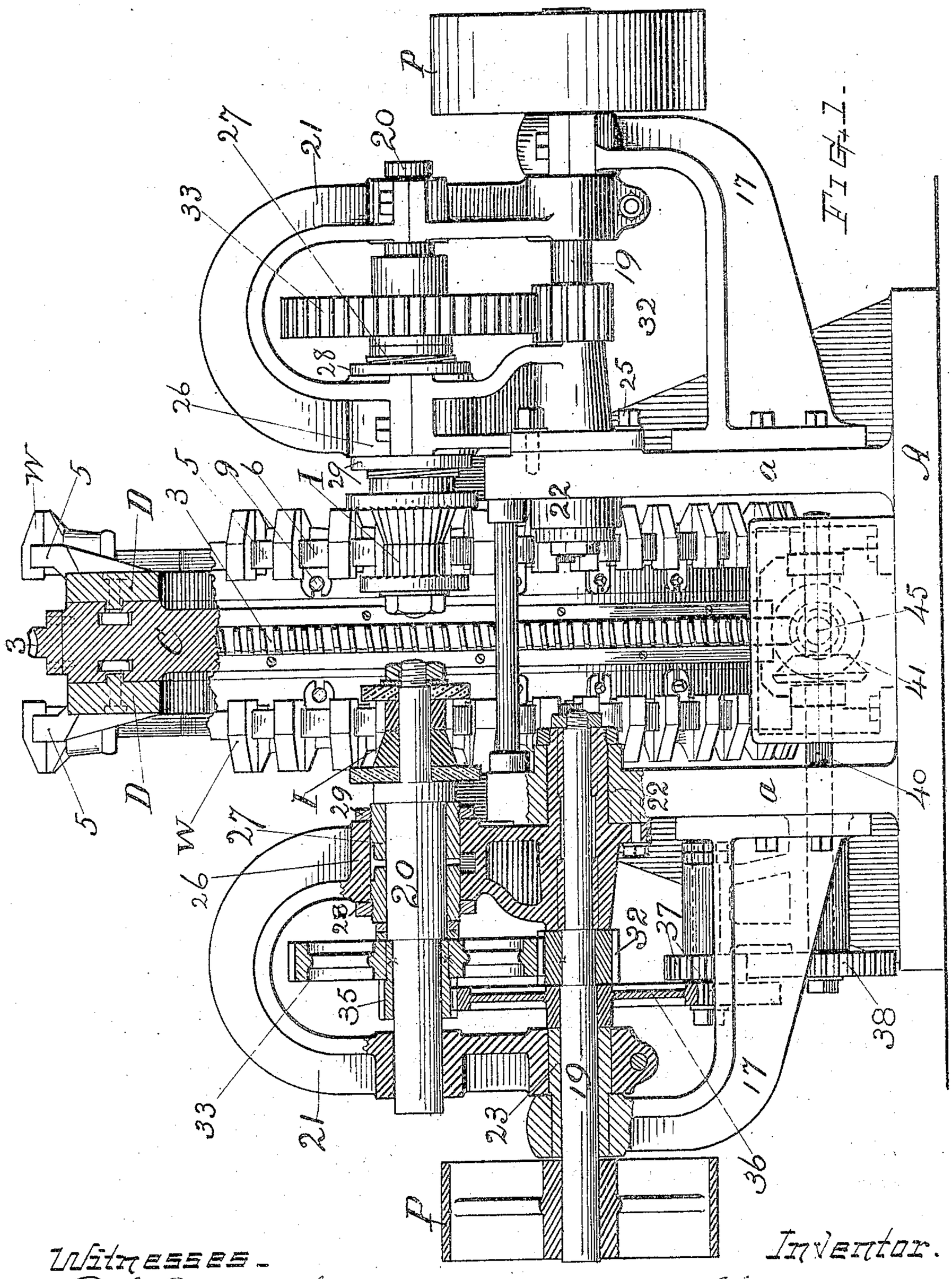
No. 804,707. PATENTED NOV. 14, 1905.

L. COES.

CONTINUOUS MILLING MACHINE.

APPLICATION FILED FEB. 20, 1905.

3 SHEETS—SHEET 1.



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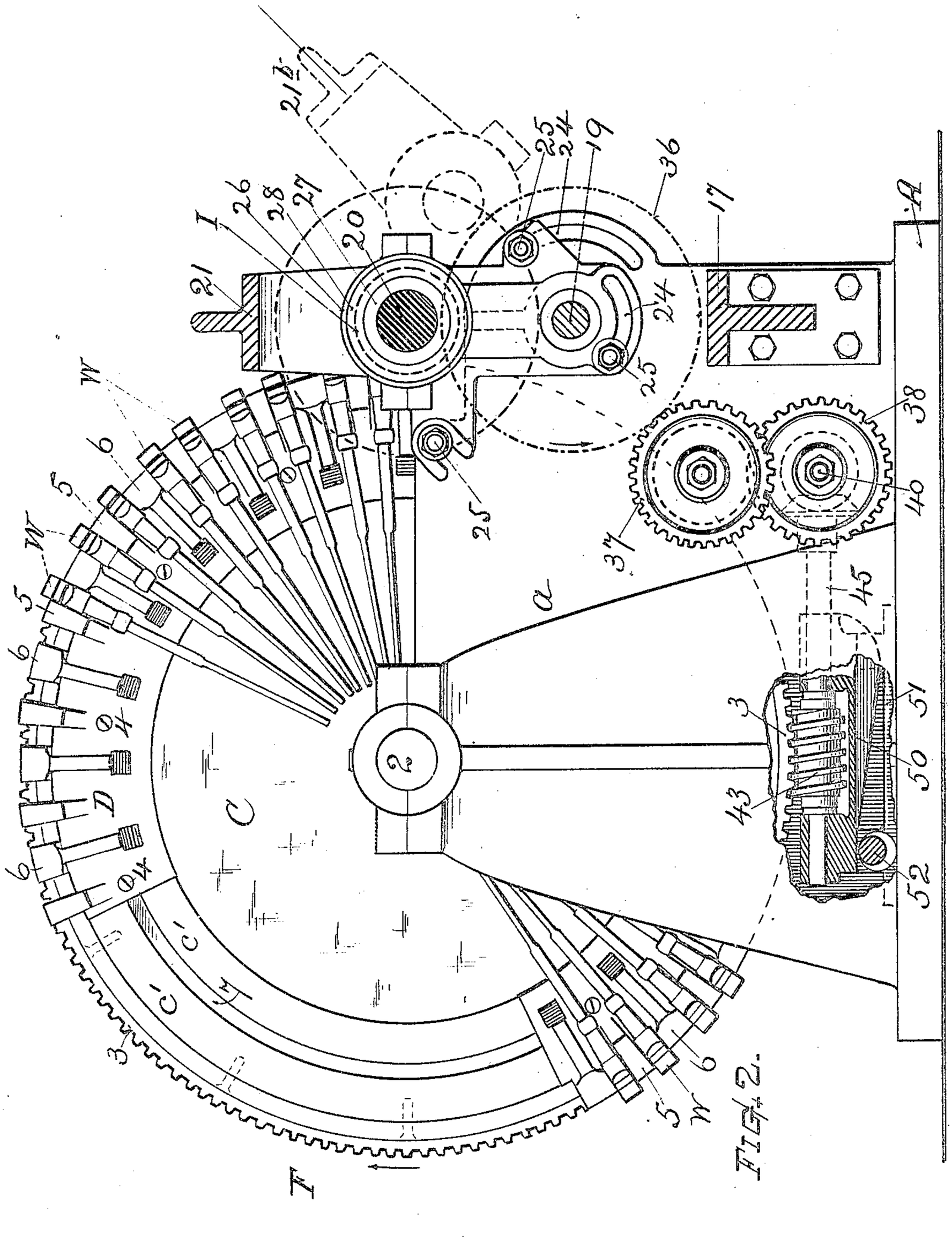

FIG. 2.

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3 SHEETS—SHEET 3.

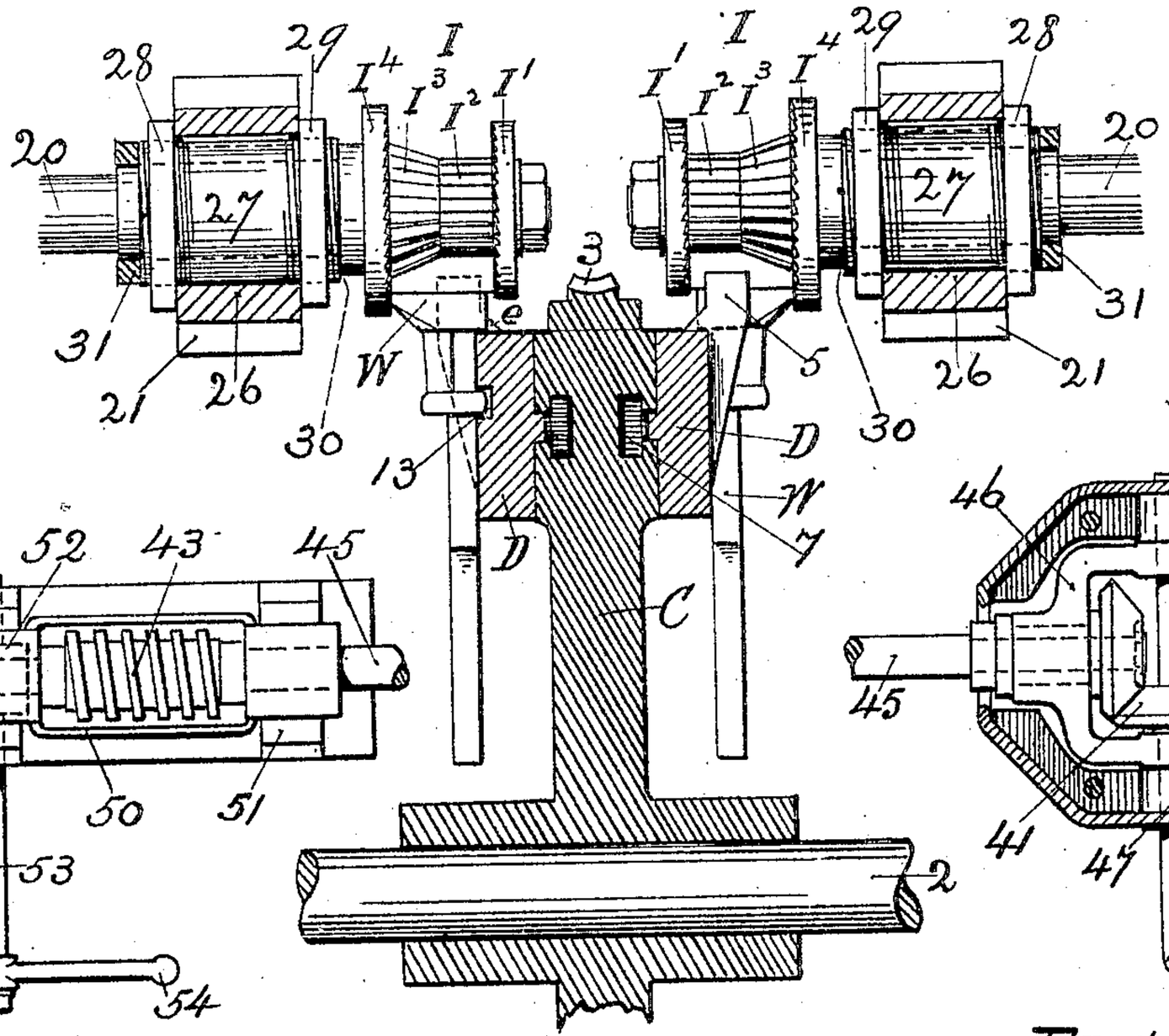

FIG. 3.

FIG. 9.

FIG. 10.

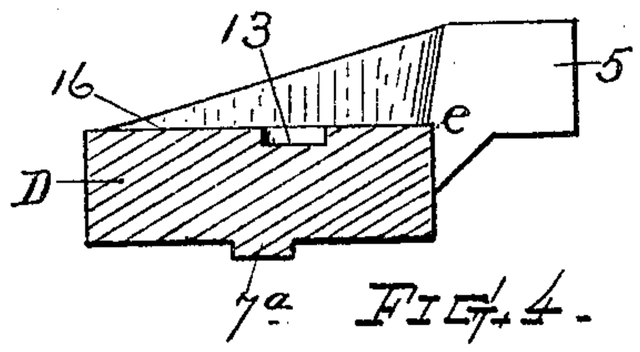

FIG. 4.

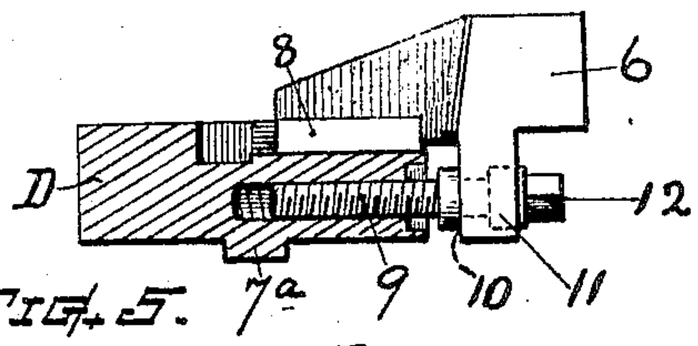

FIG. 5.

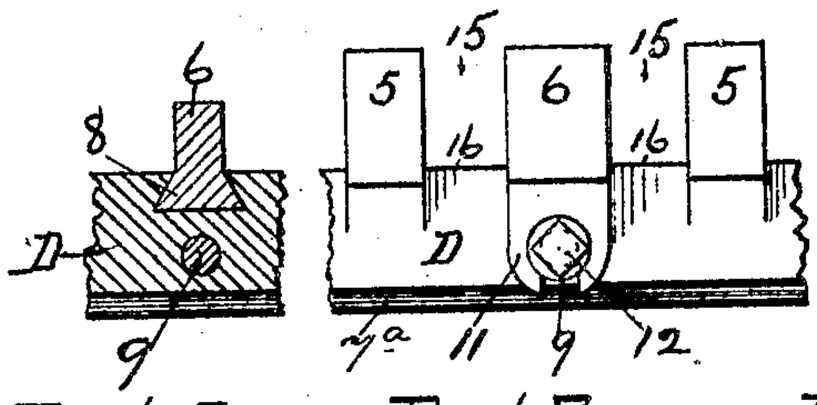

FIG. 8.

FIG. 7.

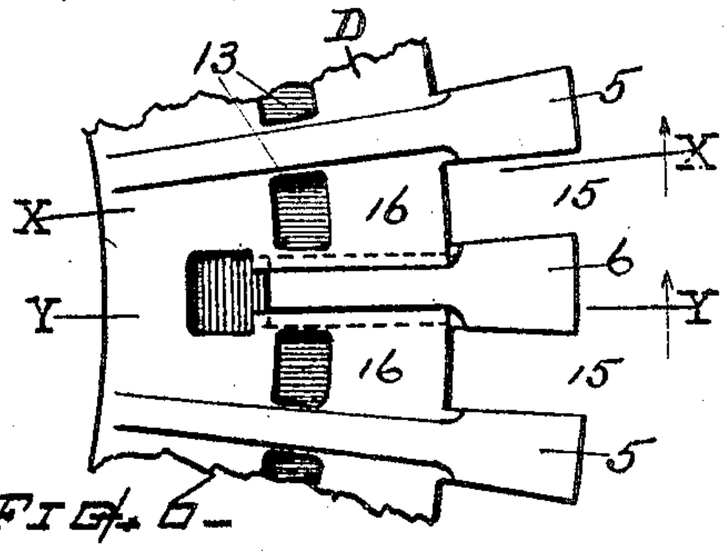

FIG. 6.

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UNITED STATES PATENT OFFICE.

LORING COES, OF WORCESTER, MASSACHUSETTS.

CONTINUOUS MILLING-MACHINE.

No. 804,707. Specification of Letters Patent. Patented Nov. 14, 1905.

Application filed February 20, 1905. Serial No. 246,382.

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 practicable and efficient mechanism for expeditiously milling off the ends and top surfaces on heads of wrenches and for similar work, also to render such mechanism adapted for continuous operation and for convenience for attendance.

Another object is to provide in a machine for the purpose specified and in combination with a revoluble carrier or wheel a novel system of work-holding devices of the character hereinafter explained.

Another object is to afford an organization of mechanism that will facilitate or permit the adjustment of the milling-cutter supports and arbors, as hereinafter explained, for regulating the position of the milling-cutters in relation to the carrier and work-holding devices or means for feeding the work to said cutters.

Another object is to provide an efficient combination of mechanism for operating the carrier by peripheral feed from and in conjunction with the cutter-driving mechanism, also to afford means for controlling the carrier-feed.

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

In the accompanying drawings, Figure 1 represents a rear view, partly in section, of a mechanism embodying my invention. Fig. 2 represents an end view of the same with the cutter-driving shafts shown in section, a portion of the frame shown as broken away to more clearly illustrate the arrangement of the feed-screw, also showing the carrier as having one of its work-supporting segments or vise-plates removed to better indicate the construction. Fig. 3 represents a horizontal sectional view of a portion of the rotary carrier and its work-holding appliances, together with a plan of the milling-cutters, illustrating the operative relation of said parts at their working positions, also showing the means for endwise adjustment of the milling-cutter arbors. Fig. 4 represents a transverse section of the work-supporting segments or vise-plate at line X X on Fig. 6, showing the side of one of its rigid jaw-blocks or abutment members. Fig. 5 represents a transverse section of said segment or vise-plate in the direction of line Y Y, showing the side of the radially-sliding quoin, wedge-piece, or work-fastening device. Fig. 6 represents a face view of a portion of the work-supporting segment or vise-plate, showing two rigid abutment members and the intermedially-disposed radially-moving wedge or fastening device. Fig. 7 is a fragmentary view showing the peripheral edge of the parts embraced in Fig. 6. Fig. 8 is a fragmentary transverse section showing the wedge-guiding member and its adjusting-screw. Fig. 9 is a separate plan view of the feed-worm and its support, and Fig. 10 is a plan view of the connections and gearing at the rear end of the feed-worm shaft.

Referring to the drawings, A denotes the bed, having thereon the main frames or uprights *a*, provided with suitable bearings, and means for supporting various parts of the mechanism.

C indicates the work-supporting carrier, which consists of a wheel or disk having a central axle or shaft 2 mounted in bearings on the uprights *a*, the carrier being revoluble in a vertical plane between the frames. It has a toothed flange or worm-gear 3 securely fixed thereon, surrounding its periphery, substantially as shown. Upon the annular faces C′ of the carrier C there are arranged circular segments or vise-plates D, affording a series of seats whereon the articles to be milled are supported. The segments may individually be made to include any convenient portion of the circle. They are rigidly secured to the carrier-wheel, preferably by a rib 7^a and T-headed bolts 4, that engage in the annular undercut or T-groove 7, formed in the carrier-rim. The segment-plates D are removable and interchangeable with segment-plates adapted for supporting different sizes and forms of wrenches or articles to be milled. These segments or vise-plates D are provided on their outer side at the periphery with projecting jaw-blocks or abutments 5, disposed in approximately radial order and having front and rear suitable faces against which the side surfaces of the wrench head and jaw can seat. Intermediate to the jaw-blocks or

abutment-faces there are arranged, in connection with the plate D, radially-movable quoins or wedge members 6 and means for adjusting the same inward or outward.

As shown in Figs. 5 to 8, the wedge-piece 6 is provided with a dovetailed guide 8, that movably fits a correspondingly-shaped radial groove formed in the plate D, and beneath said guide parallel therewith is arranged an adjusting-screw 9, threaded into a hole in the edge of the plate and having a suitably-collared neck 10, that engages a recessed lug 11, formed on the reverse side of the wedge-piece, the outer end 12 of the screw being formed to receive a key, wrench, or driver, whereby it may be readily turned by the attendant for securing or releasing the work, as required. The plate is recessed at 13 to accommodate the strap of the wrench-jaw.

The wrenches W or articles to be milled are placed individually in the respective spaces 15 between the faces of the jaw-block or abutment members 5 and the radially-movable wedge member 6, with the back of the wrench-bar seated against the flat surface 16 of the plate D and with the angle of the upper jaw-strap resting against the peripheral corner of the vise-plate at *e*. (See Fig. 3.) The wedge-piece 6 being then moved inward by its adjusting-screw 9 causes the heads of the wrenches to be firmly clamped between the wedge-surfaces and the opposite abutment-surfaces, two wrenches being secured by each wedge-piece. The wrenches W are held with their heads transverse to the plane of the carrier, their shanks or bars disposed radially, or approximately so, and pointing inward from the carrier-rim and with the heads of the wrenches projecting outward beyond the abutment members 5 and wedge members 6, the head and jaw of the wrench being held rigidly thereby in connection with the carrier, substantially as illustrated.

In the present instance and preferably the carrier C is made dual-faced or with work-holding means upon each side thereof for simultaneously carrying two series of wrenches. (See Fig. 1.) Accordingly two sets of milling-cutters and mill-operating mechanism are arranged in combination therewith, the same being disposed in right and left order. These mechanisms being in most respects similar, a description of one will apply to either or both so far as similarity exists. Such mechanism consists of an operating-shaft 19, rotatable in bearings supported on the frame *a*, and on a projecting arm 17, attached to the frame. The cutter-carrying arbor 20 is supported in bearings on a rearwardly-swinging yoke or frame 21, which in the present instance is arranged to swing on an axis coincident with the axis of the operating-shaft 19. The inner portion or leg of the yoke-frame 21, as shown in section on Fig. 1, is provided with a tubular journal that is fitted in a suitable bearing at 22 in the upright frame *a* and in turn forms the bearing for shaft 19, while the outer leg of the yoke-frame is formed with a bearing that is supported upon a quill or sleeve 23, surrounding the shaft 19 and fixed in the bearing end of the bracket-arm 17. The adjacent parts of the frames 21 and *a* are provided with countermatching supporting-surfaces, curved slots 24, and clamping-bolts 25, by which adjustment can be effected and the yoke-frame retained securely at any adjusted position. When the bolts are loosened, the yoke-frame, with the arbor and milling-cutters, can be swung back, as indicated by dotted lines at 21^b, Fig. 1, to facilitate removal, changing, or adjustment of the cutters.

For the milling operation I provide a gang of milling-cutters I, comprising a cylindrical cutter I^2 for milling off the straight portion of the wrench-head, a conoidal cutter I^3 for milling off the inclined portion of the wrench-head, and two oppositely-disposed flange-shaped cutters I′ and I^4 for simultaneously squaring off the hammer-face end of the head and the nose end of the head and jaw, as indicated in Fig. 3.

Combined with the cutter-carrying arbor 20 and frame 21 there is an endwise-adjustable bearing-sleeve 27, arranged non-rotatable in the frame with a spline or other suitable device and provided at its ends with screw-threads, upon which are arranged threaded rings or nuts 28 and 29, that screw up against the ends of the frame-bearing 26. The arbor 20 is confined from endwise movement within the sleeve by suitable collars or shoulders at 30 and 31.

By adjusting the sleeve within the frame-bearing 26 by aid of the threaded ring-nuts 28 and 29 the alinement of the milling-cutters in relation to the plane of the vise-plates D or series of wrenches carried thereby can be accurately regulated as desired.

The operating-shaft is provided with the drive-pulley P and with a pinion 32, keyed thereto, which pinion meshes with a gear 33, fixed upon the arbor 20, and by this means the milling-cutters are operated.

Combined with one set of the cutter-operating mechanism there is provided means for driving the carrier-feed devices as follows: To the arbor 20 or the hub of the gear 33 there is fixed a pinion 35, that meshes with a gear 36, that runs loose upon the shaft 19. This latter gear, in conjunction with a suitable train of gears 37 and 38, operates a shaft 40, that extends through bearings at the side of the frame *a* and is provided with suitable gearing at its inner end for operating the feed-shaft 45, which latter is arranged approximately tangential to the circle of the carrier C and is provided with a worm-screw 43, that engages with the peripheral worm-gear 3 of the carrier-wheel. By the rotation of said worm-screw a steady and powerful rotative

movement of said carrier is effected for advancing the work to and past the milling-cutters.

The rear end of the feed-shaft is best arranged in a swinging coupling-bearing 46, (see Fig. 10,) hinged upon the cross-shaft, which latter is supported in bearings 47. The two shafts are operatively connected by bevel-gears 41. The couplings and gears are preferably protected by a housing or incasing box 49, having a close cover and only an opening in the side sufficient for the passage of the feed-shaft.

The worm-screw 43 is arranged upon the shaft 45 near its front end, where it is provided with a bearing-cradle 50, (see Figs. 1 and 9,) which is confined laterally by a suitable guide-stand 51, but is adapted for movement toward and from the worm-gear 3 of the carrier. At the back or beneath this bearing-cradle there is a cam or eccentric 52, controlled by a rod or shaft 53, provided with a suitable handle device 54 at the exterior of the frame. By means of said cam the cradle and shaft can be moved for throwing the worm-screw 43 into and out of mesh with the worm-gear 3 of the carrier, and thereby rendering the feed devices effective or non-effective, as desired. The bearing-cradle is best formed as a basin for containing lubricant or oil about the worm-screw.

In practice the movable wrench-jaw is assembled and driven onto the forged wrench-bar, and the side faces of the head and jaw are squared or milled off preparatory to their subjection to the present-described mechanism, the operation of which is as follows: The milling-cutters having been adjusted to proper relation to the carrier and the machine put in motion, the attendant at the front of the machine at F places the wrenches or work W in proper position upon the carrier vise-plates against the abutments 5 and secures them rigidly by operation of the quoins or wedge-pieces 6. The movement of the carrier advances and successively presents the heads to the milling-cutters, the attendant removing the milled wrenches as they are brought to the front and replacing them by unmilled wrenches, the operation being thus carried on in a continuous and comparatively rapid manner.

I claim as my invention—

1. A continuous milling-machine, comprising in combination, a revoluble carrier-disk provided upon each of its opposite faces with means for supporting thereon a series of wrench-bars with their heads outwardly projecting, right and left gangs of milling-cutters respectively in the path of the movement of and arranged to trim the tops and opposite ends of the heads of said supported series of wrench-bars, a rotating arbor for each gang of cutters, rearwardly-swinging adjusting-frames having said arbors mounted in bearings thereon, means for securing said frames at position of adjustment, operating shafts and gearing for rotating said cutter-arbors, and means for revolving said carrier to advance the wrench-heads to and past said milling-cutters.

2. In a continuous milling-machine, having a revoluble carrier, the removable segments or vise-plates provided with work-holding devices comprising rigid projecting abutment members and radially-movable wedge-pieces intermediate to said abutment members, and means for adjusting said wedge-pieces.

3. In combination with the rotary carrier, a work-holding vise-plate provided with a plurality of rigid radially-disposed jaw-blocks or abutments, radially-movable wedge members respectively positioned intermediate to and in alternation with said abutments, and means for adjusting said wedge members inward and outward for clamping work between the wedge and abutment faces, and for releasing the same.

4. In a continuous milling-machine, a work-holding means comprising a plurality of rigid jaw-blocks or abutments having lateral work-seating surfaces, an endwise-movable quoin or wedge member disposed intermediate to and having work-holding faces positioned in alternate opposite relation to said abutments, guide devices for said wedge member, and an adjusting-screw arranged for operating the movable quoin or wedge member for simultaneously clamping a pair of wrenches or articles against the adjacent opposite abutments.

5. In a continuous milling-machine of the character described, the combination, with the rotary carrier-disk, of removable work-holding segment-plates provided with a plurality of radial projecting jaws or abutments, and intermediate endwise-movable wedge members positioned in alternate relation therewith, radial guideways for said wedge members, and screws for effecting movement of the wedge members; said segment-plates provided with intervening flat seating-surfaces for receiving the back of the wrench-bar, recesses to accommodate the wrench-jaw strap, and means for gaging the position of the wrench in relation to the circle of the carrier.

6. In a milling-machine for the purpose specified, in combination with the main frame, the revoluble carrier mounted in bearings thereon, the milling-cutters, cutter-arbor, and operating-shaft; of an outwardly-swinging yoke-frame having the cutter-arbor bearings thereon, said yoke-frame journaled axially concentric with the operating-shaft, and, in conjunction with the main frame, provided with countermatching surfaces, curved slots, and releasable fastening devices within said curved slots, for securing said yoke-frame with the cutter-arbor at position of adjustment.

7. In a continuous milling-machine, the combination, of a revoluble carrier provided with means for holding, transversely supported, a series of wrench-head members, a group of milling-cutters comprising a cylindrical cutter, a beveled cutter, and two oppositely-flanking disk-shaped cutters adjacently disposed for simultaneously milling the top and both end surfaces of a wrench-head, a rotatable arbor supporting said cutters, a swing-frame carrying the cutter-arbor parallel with the carrier-axis, means for adjusting the swing-frame toward and from the periphery of the carrier, and means substantially as described for adjusting the position of the cutter-supporting arbor endwise in relation to the carrier.

8. A machine for the purpose specified, comprising a pair of upright frames, a revoluble carrier-wheel intermediate thereto, its axles or shaft supported in bearings on said uprights, laterally-extending bearing-frames at the right and left of said uprights, operating-shafts mounted therein, a pair of rearwardly-swinging yoke-frames, a cutter-arbor journaled in each yoke-frame, milling-cutters mounted on said arbors in alinement with the respective planes of the carrier-faces; a drive-wheel on each operating-shaft, intermeshing gears connecting the respective drive-shafts and cutter-arbors, and a train of gear mechanism adapted for revolving the carrier in conjunction with one of the cutter-operating shafts.

9. In a machine of the character specified, the combination as described, with the revoluble peripherally-geared carrier disk-wheel having work-holding devices thereon adapted for securing, in successive order, a series of wrench members or the like, and the feed-shaft 45, and worm-screw 43 for actuating said carrier; of the yoke-frame 21 having fulcrum-journals supported in bearings on the stationary main frame, the cutter-arbor 20 journaled on said yoke-frame, the milling-cutters on said arbor, the operating-shaft 19 coincident with the yoke fulcrum-journals, a pinion 32 and gear 33 connecting said operating-shaft and cutter-arbor, a pinion 35 fixed on said arbor, a gear 36 meshing therewith and running loose on said operating-shaft, the cross-shaft 40, gears 41 connecting the cross-shaft and feed-shaft, and the gear-train 37 and 38 from said loose gear to said cross-shaft, substantially as set forth.

Witness my hand this 17th day of February, 1905.

LORING COES.

Witnesses:
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