(No Model.) 3 Sheets—Sheet 1.

C. E. HOPPES.

BOILER PLATE MILLING MACHINE.

No. 574,063. Patented Dec. 29, 1896.

Fig. 1

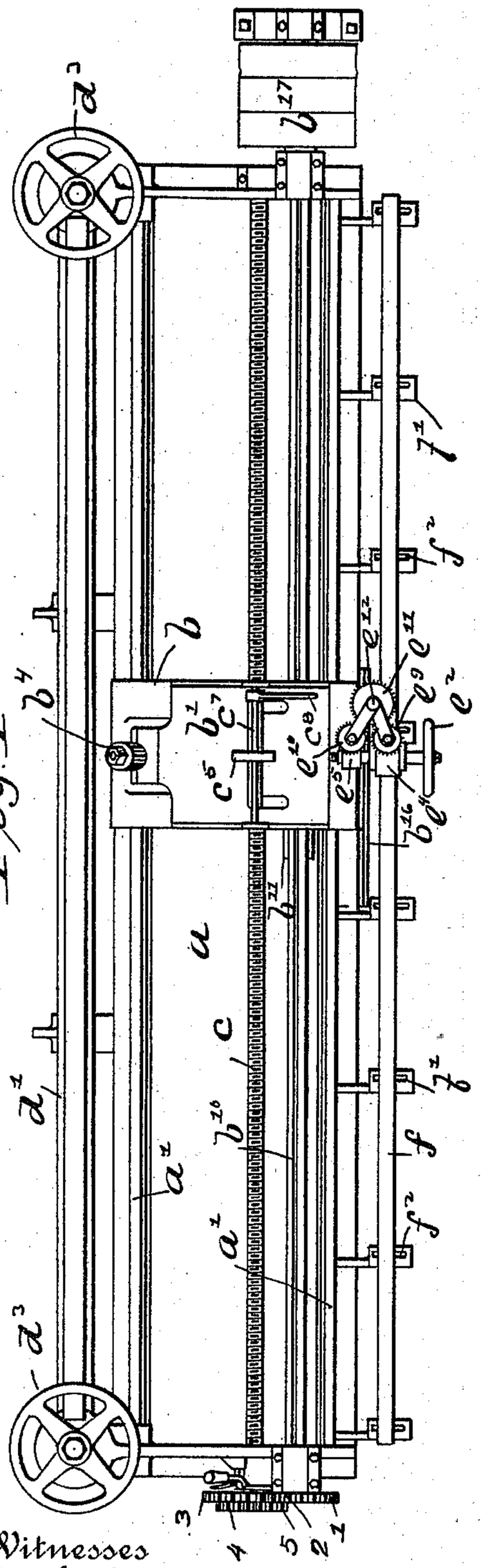

Fig. 2

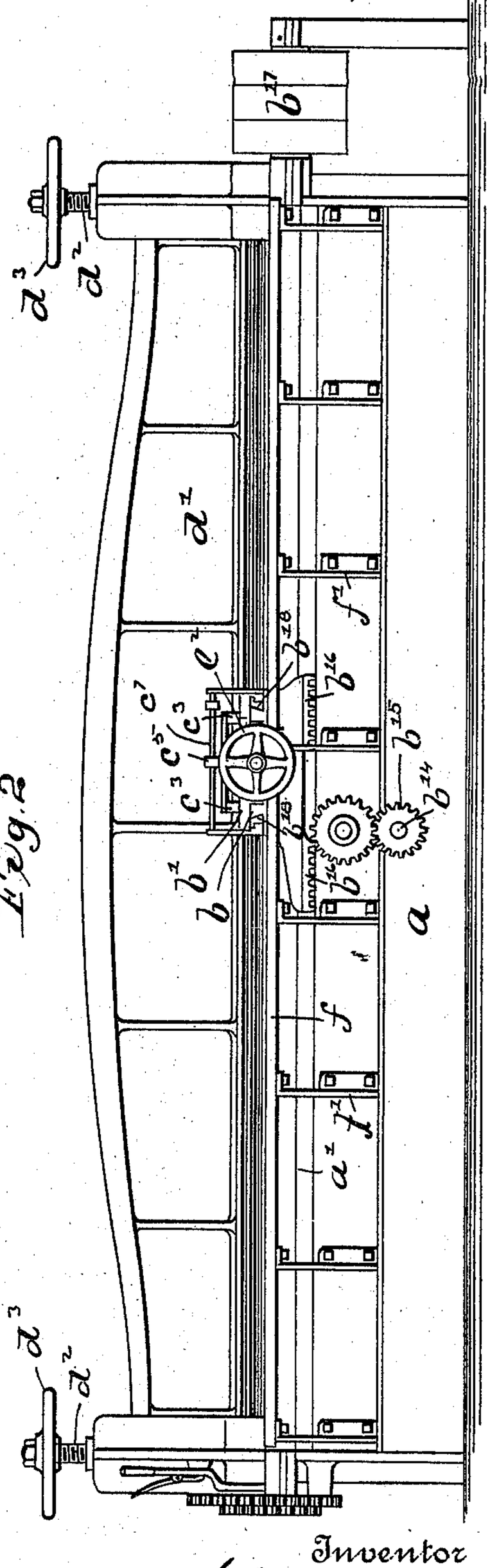

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Fig. 5

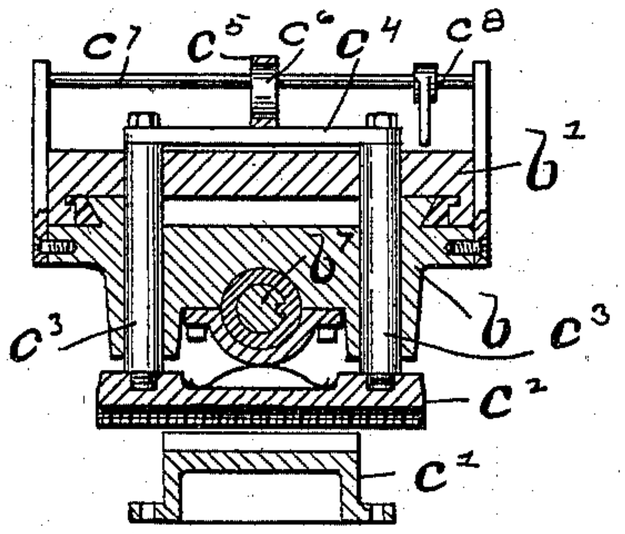

Fig. 3

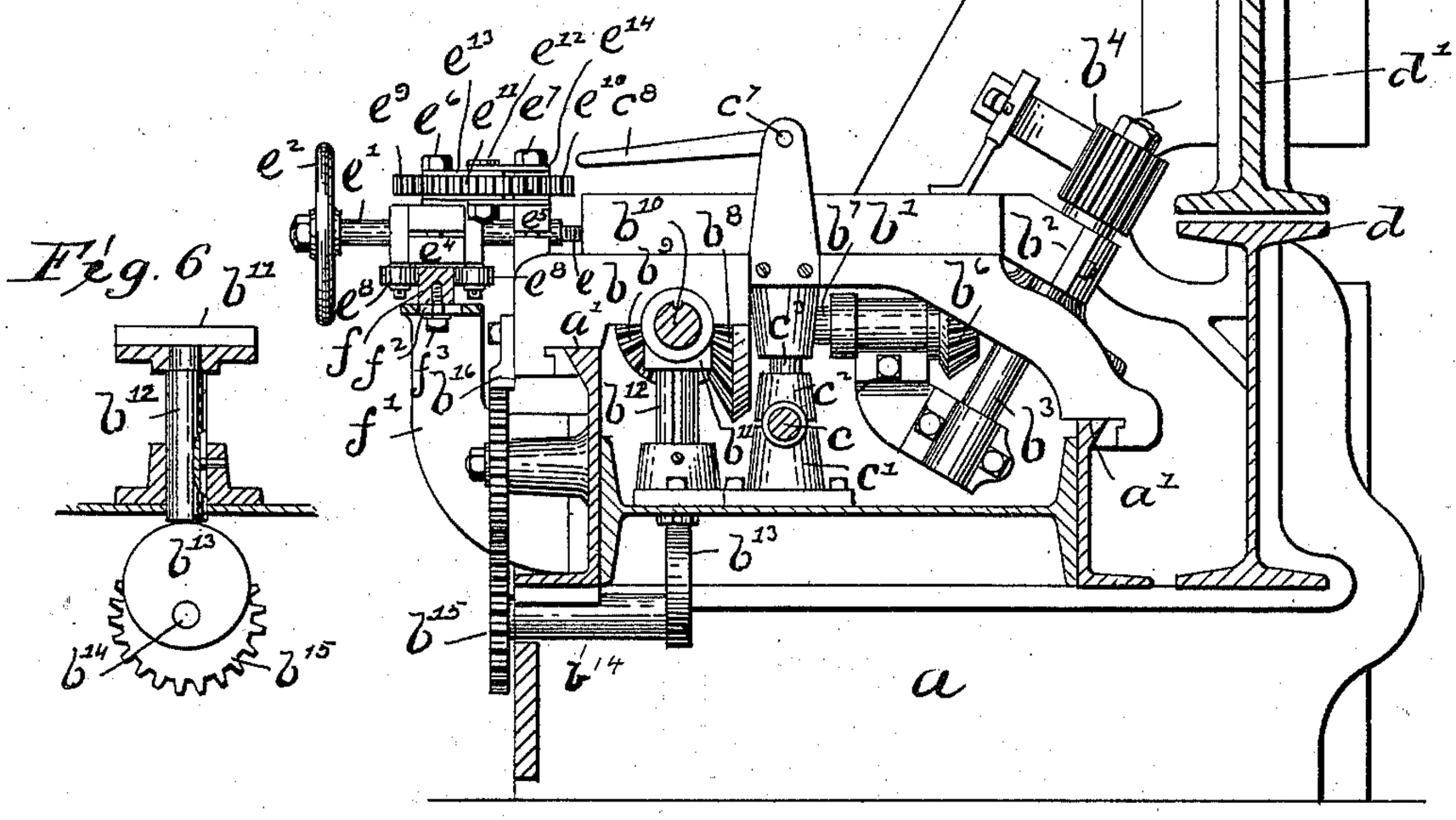

Fig. 6

Fig. 4

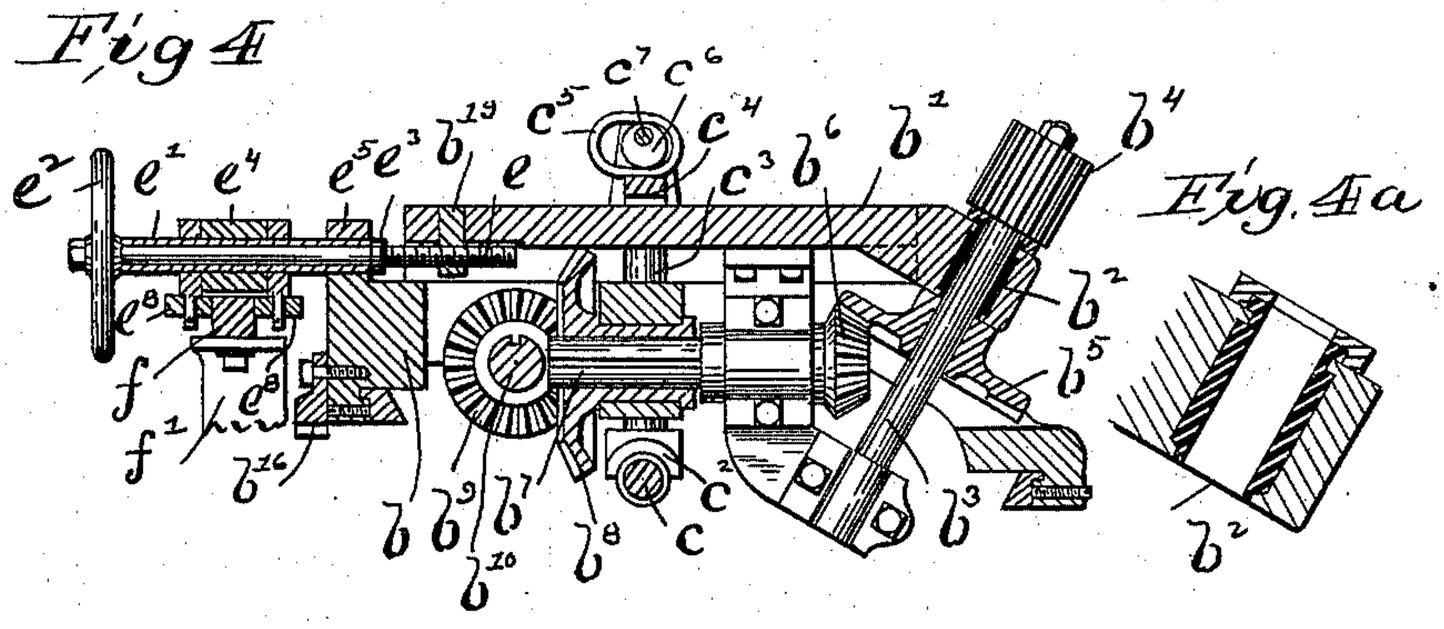

Fig. 4a

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BOILER PLATE MILLING MACHINE.

No. 574,063. Patented Dec. 29, 1896.

Fig. 7

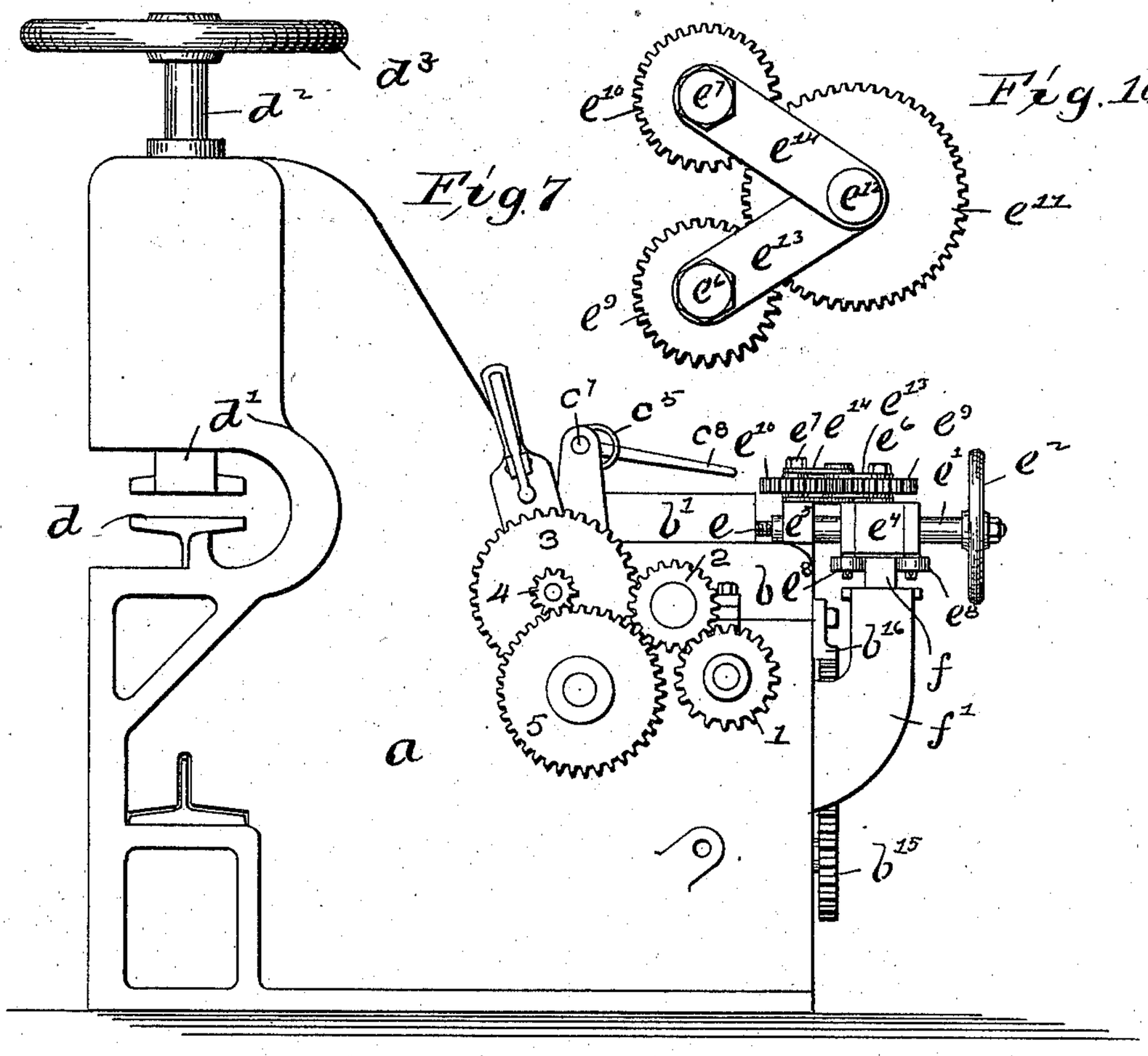


Fig. 10

Fig. 8.

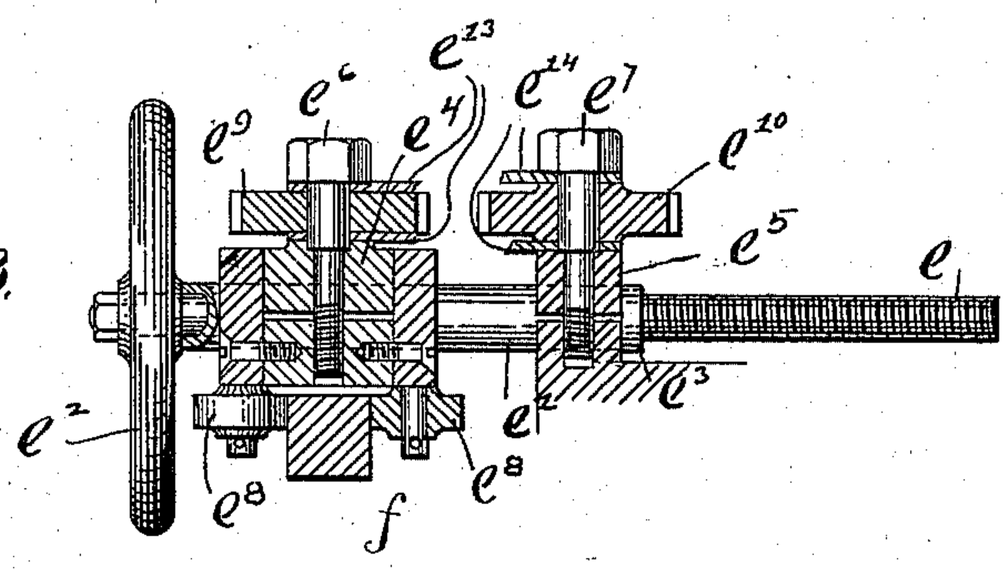
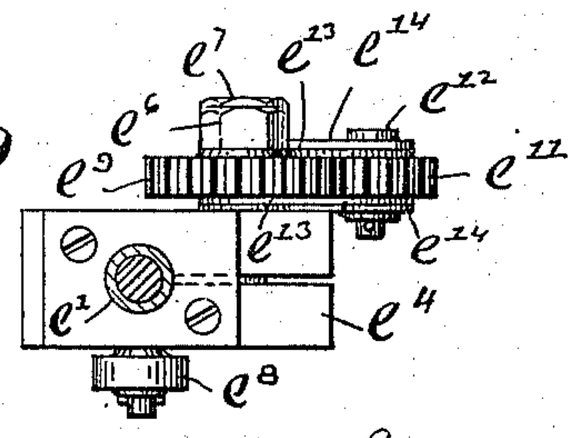


Fig. 9



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UNITED STATES PATENT OFFICE.

CHARLES E. HOPPES, OF SPRINGFIELD, OHIO.

BOILER-PLATE-MILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 574,063, dated December 29, 1896.

Application filed August 8, 1896. Serial No. 602,162. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. HOPPES, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Boiler-Plate-Milling Machines, of which the following is a specification.

My invention relates to improvements in milling-machines; and the object of my invention is to provide a machine especially adapted for milling the edges of boiler-plates. I attain this object by the constructions shown in the accompanying drawings, in which—

Figure 1 is a plan view of a machine embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a transverse section of a portion of the same. Fig. 4 is a longitudinal section of the traveling cutter-head. Figs. 4^a, 5, and 6 are detail views of the same. Fig. 7 is an end elevation, and Figs. 8, 9, and 10 are detail views of the adjusting devices for the traveling cutter-head.

Like parts are represented by similar letters and numerals of reference in the several views.

In the said drawings, *a a* represent a main frame which is provided with suitable longitudinal ways a', on which is adapted to travel a carriage *b*. This carriage has a movable head b', provided at one end with suitable bearings b^2, in which is mounted an angularly-arranged spindle b^3, on which is mounted a rotary cutter b^4 and also a beveled gear b^5. This beveled gear b^5 meshes with a pinion b^6 on a transverse shaft b^7, which is provided at the other end with a laterally-movable beveled gear b^8, meshing with a laterally-moving gear b^9 on a longitudinal shaft b^{10}. The shaft b^{10} extends throughout the entire length of the machine and is preferably supported at intervals by bearing-supports b^{11}, which are in the nature of half-boxes and are supported by adjustable columns b^{12}, which rest at the bottom on cams b^{13}. These cams b^{13} are secured on the ends of short shafts b^{14}, which extend through one side of the frame and carry on the outside of the frame pinions b^{15}. The traveling head *b* is provided with rack-sections b^{16}, adapted as the head moves to contact with the pinions b^{15} and thus revolve the cams, the construction being such that as the head approaches one of the bearing-supports b^{11} said bearing-support will, by the action of the pinion and cam, be lowered to permit the driving-gear b^9 to pass over the same, when it will again be raised to position to support the longitudinal shaft b^{10}.

There is extending longitudinally through the frame a feed-shaft, or, more properly speaking, a "feed-screw" *c*. This feed-screw is supported at intervals by suitable bearing-supports c' and is adapted to be engaged by an internally-screw-threaded half-sleeve c^2, supported on the lower ends of longitudinally-moving rods c^3, slidingly mounted in bearings in the movable head *b*. Connected to the rod c^3 by a curved bar c^4 is a yoke c^5, which embraces a cam c^6 on a transverse shaft c^7, said shaft being provided with a handle or lever c^8, by means of which it may be partially revolved, thus through the medium of the cam lowering or raising the screw-threaded half-sleeve c^2 to cause it to engage or disengage the feed-screw *c*.

Means are provided for driving the shaft b^{10} from usual driving-pulleys b^{17}, arranged at one end of the frame, a driving connection being established between said shaft and the feed-screw through the medium of suitable variable-speed gears 1, 2, 3, 4, and 5.

Arranged in front of the traveling cutter-head and extending the entire length of the machine is a bed-plate *d*, and above this bed-plate is a clamping-beam d', which is adapted to be moved in a well-known manner by screws d^2, having hand-wheels d^3. Upon this bed-plate *d* the plate to be milled is placed and clamped thereon by means of the clamping-screws d^2. The machine is then started and the cutter-head caused to travel longitudinally along the plate with the revolving cutter in contact with the edge of said plate. The cutter, being arranged at an angle, will mill the edge of the plate at the proper angle desired.

As is well known, in producing a boiler-shell the different sections formed by uniting the ends of the various plates are put together by inserting one end of one plate in the end of the next succeeding plate, the sections being made slightly tapered for this purpose. In order to produce this taper, it is necessary that one end of the boiler-plates be slightly convex and the other end slightly concave.

To accomplish this and to provide means for milling the edge of the plate automatically to any desired curve, I support the movable head b' on suitable ways b^{18} and provide said head with a nut b^{19}, with which engages the end of a screw-threaded rod e. This screw-threaded rod e passes through a sleeve e' and is provided at one end of the sleeve with a hand-wheel e^2 and at the other end of the sleeve with a collar e^3. The sleeve is supported in two split bearings e^4 and e^5, which are respectively provided with clamping-screws e^6 and e^7, adapted to clamp said sleeve and prevent longitudinal movement thereof through said bearing. The bearing e^5 is secured to the carriage b, while the bearing e^4 is independent of the carriage.

Extending longitudinally along one side of the frame is a flexible bar f, supported at suitable intervals from the main frame by brackets f', having at the top slotted openings f^2, through which extend screws f^3, which engage with the bar f and hold it in different positions of adjustment on said brackets. The split bearing e^4 is provided at each side with a roller e^8, which rollers are adapted to engage on opposite sides of the flexible bar f. This bar f is adapted to be bent to any suitable curve to correspond with the curvature desired on the edge of the plate to be milled, and by loosening the sleeve e' in the clamping bearing e^5 and tightening the bearing e^4 on said sleeve the movable head b' with the cutter and its driving mechanism will be moved to or from the plate being milled by the bar f, so that the edge of the plate will assume the same shape as that of the bar. If the sleeve is clamped in the bearing e^5 and the bearing e^4 loosened, then the cutter will be caused to move straight across the plate, though it may be moved back or forth in either position by the hand-wheel e^2.

To provide for loosening one of the clamps whenever the other is tightened and thus prevent both of said clamps from being tightened at the same time, I place on the respective clamping-screws e^6 e^7 spur-pinions e^9 e^{10}, each adapted to engage in an intermediate gear e^{11}. This intermediate gear is supported on a stud e^{12}, supported in the ends of links e^{13} e^{14}, the opposite ends of which are journaled on clamping-screws e^6 e^7, so as to permit the bearings e^4 e^5 to be separated without breaking the gear connection between the respective gears. The clamping-screws e^6 e^7 are made to turn in opposite directions, that is, one is a right-hand screw and the other a left-hand, and the construction is such that whenever one screw is turned to clamp its bearing the other screw will be correspondingly turned to loosen its bearing, so that it is impossible to clamp both of said bearings at the same time to said sleeve.

It will be seen by the above description that by changing the curve of the bar f the plate may be milled to any desired curvature, either convex or concave, and that milling boiler-plates to the proper curvature to produce the desired taper of the shell is accomplished automatically, the machine being once set to the proper position and the plate properly clamped therein.

Having thus described my invention, I claim—

1. In a boiler-plate-milling machine, a stationary support, clamping devices adjacent to said support, a traveling carriage supported on guides or ways parallel and adjacent to said support, and a movable head having an angularly-arranged cutter supported on said carriage, driving devices for moving said traveling head and operating said cutter, and a flexible guiding-bar adjacent to the line of travel of said head, and engaging devices on said movable head to engage said bar to cause said head to follow the line of said bar, substantially as specified.

2. The combination with the moving carriage, the movable head thereon, and a guiding-bar adjacent to the line of travel of said carriage, and an adjusting-screw for said head, said adjusting-screw being supported in a sleeve in two independent clamping-bearings, one of said bearings being supported on said carriage and the other supported adjacent to the guiding-bar and having projections to engage said bar, and means as described for simultaneously operating said clamping devices in opposite directions to clamp one and unclamp the other, substantially as specified.

3. The combination with a traveling carriage and a movable head thereon having an angularly-arranged cutter as described, a guiding-bar supported on brackets having slotted openings, and means for securing said bar to said brackets, an adjusting-screw for said head mounted in a sleeve which is supported in clamping-bearings as described, projections on one of said bearings to engage said guiding-bar, clamping-screws for each of said bearings and intermeshing gears between said clamping-screws to cause said clamping-screws to be simultaneously operated, substantially as and for the purpose specified.

4. The combination with the traveling carriage and the cutter thereon, a feed-screw for said carriage, a driving-shaft for said cutter, movable supports for said shaft, raising and lowering devices operated by gear for raising and lowering said supports, and gear-segments on each side of said carriage for engaging said gear to alternately raise and lower said supports, substantially as specified.

In testimony whereof I have hereunto set my hand this 31st day of July, A. D. 1896.

CHARLES E. HOPPES.

Witnesses:
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CHAS. I. WELCH.