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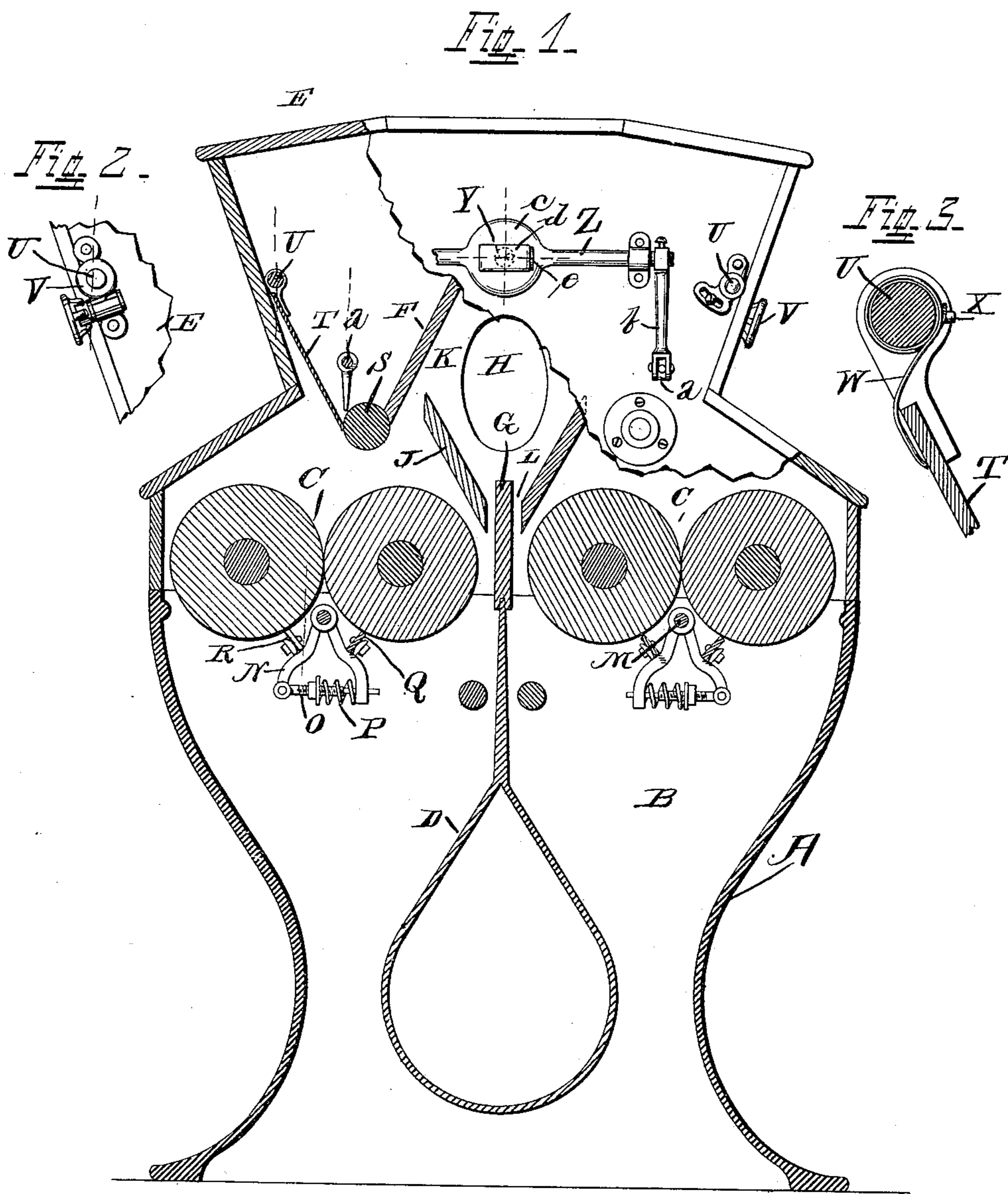
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J. D. MAWHOOD.

ROLLER MILL.

No. 373,408.

Patented Nov. 15, 1887.



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(No Model.)

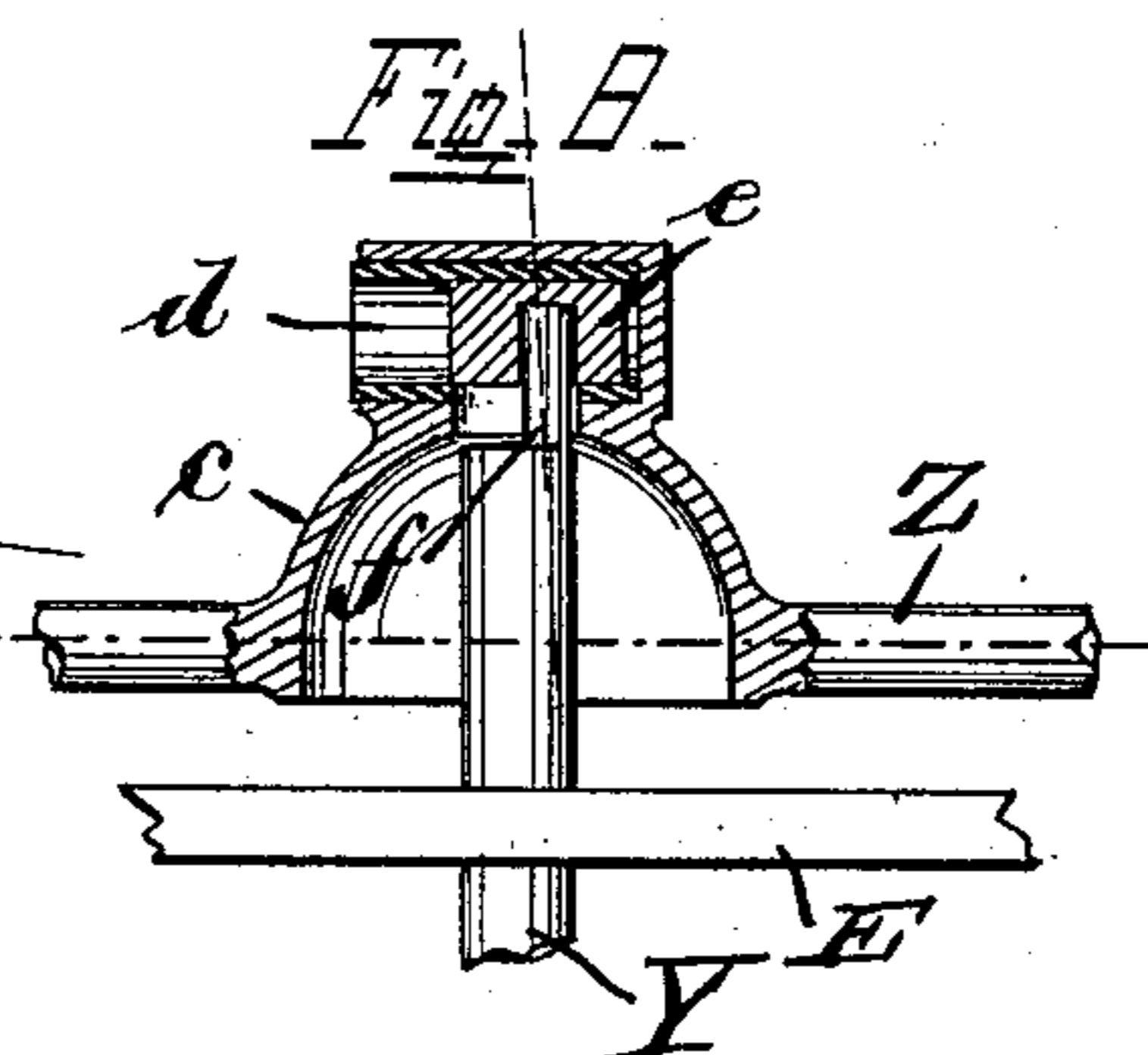
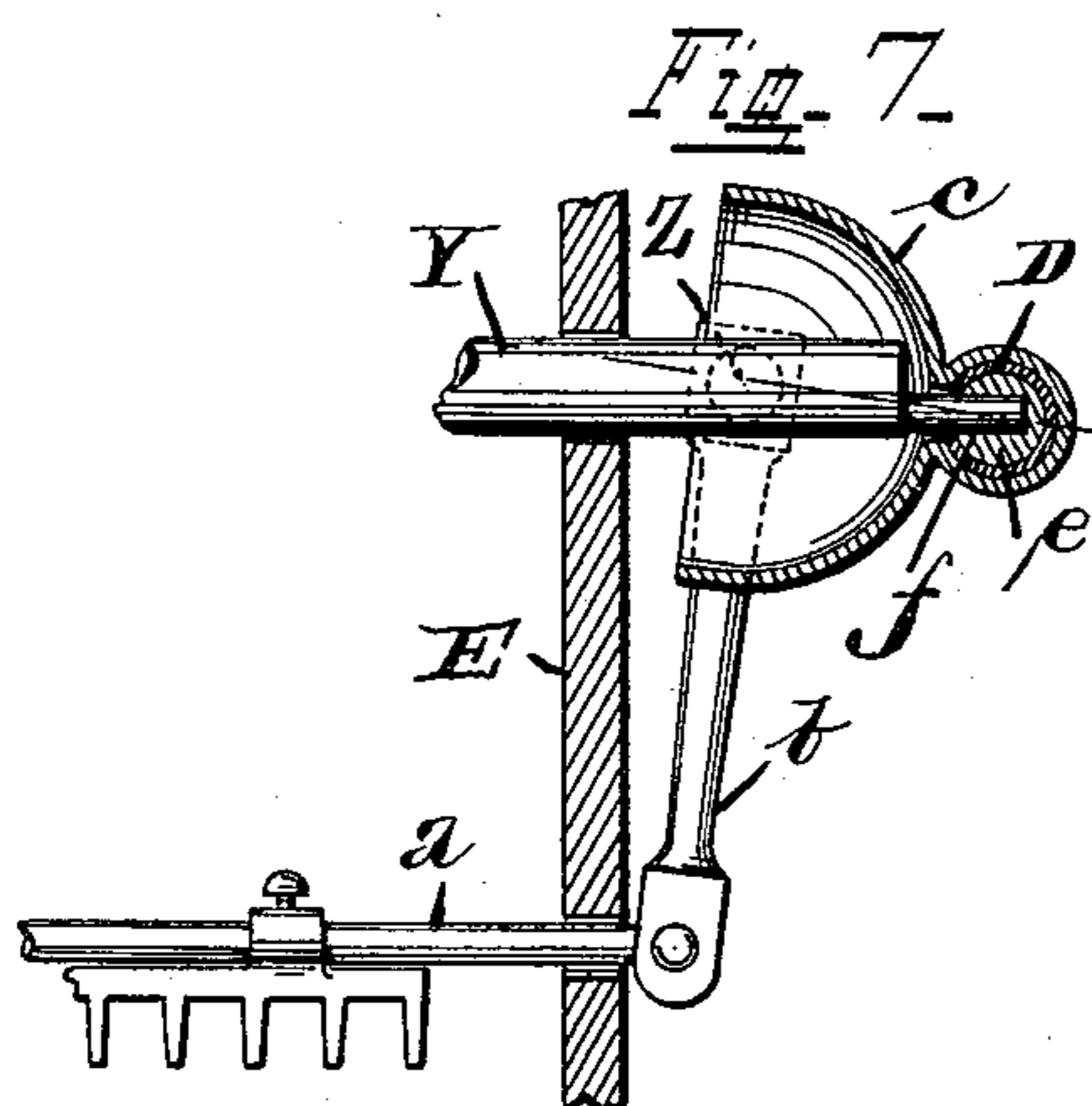
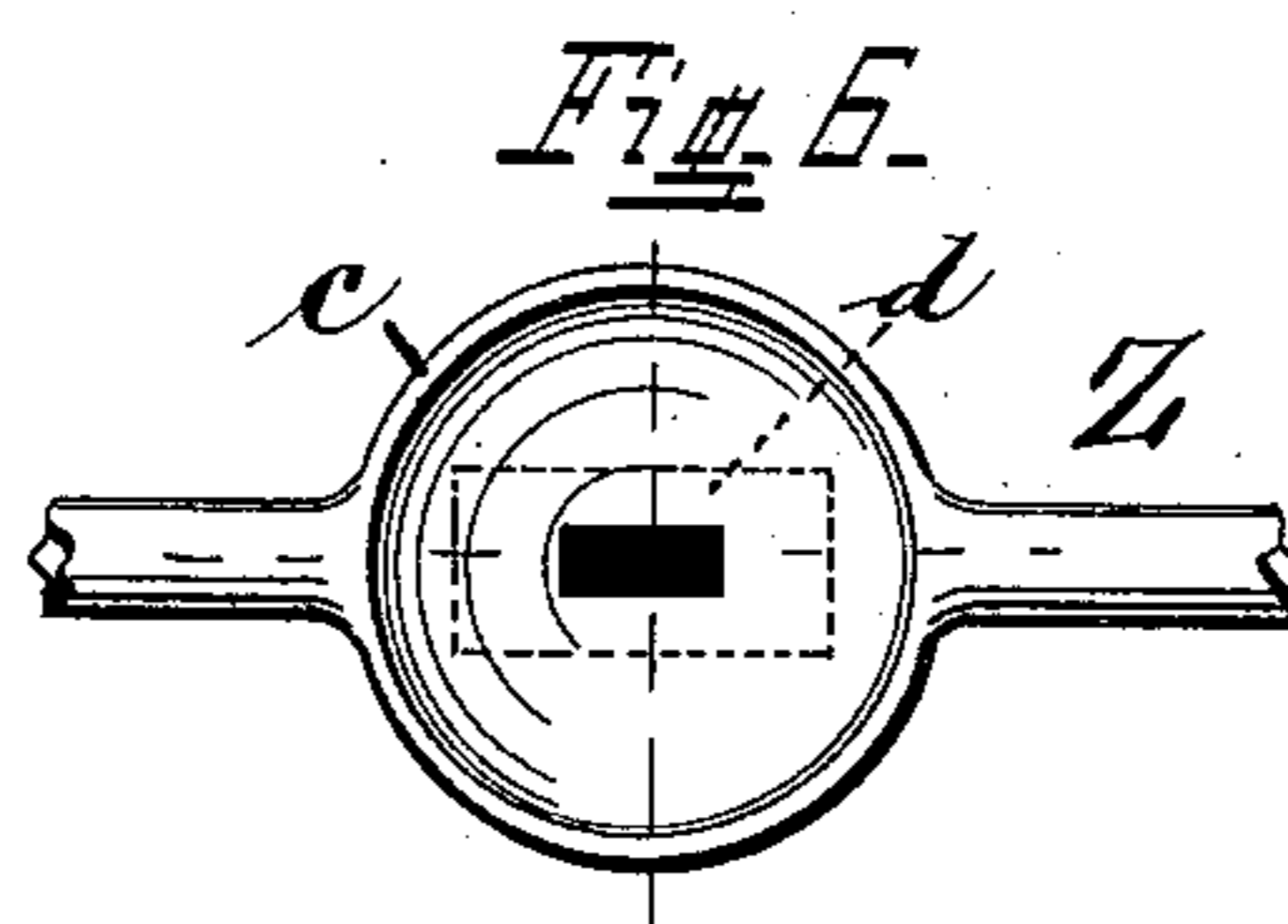
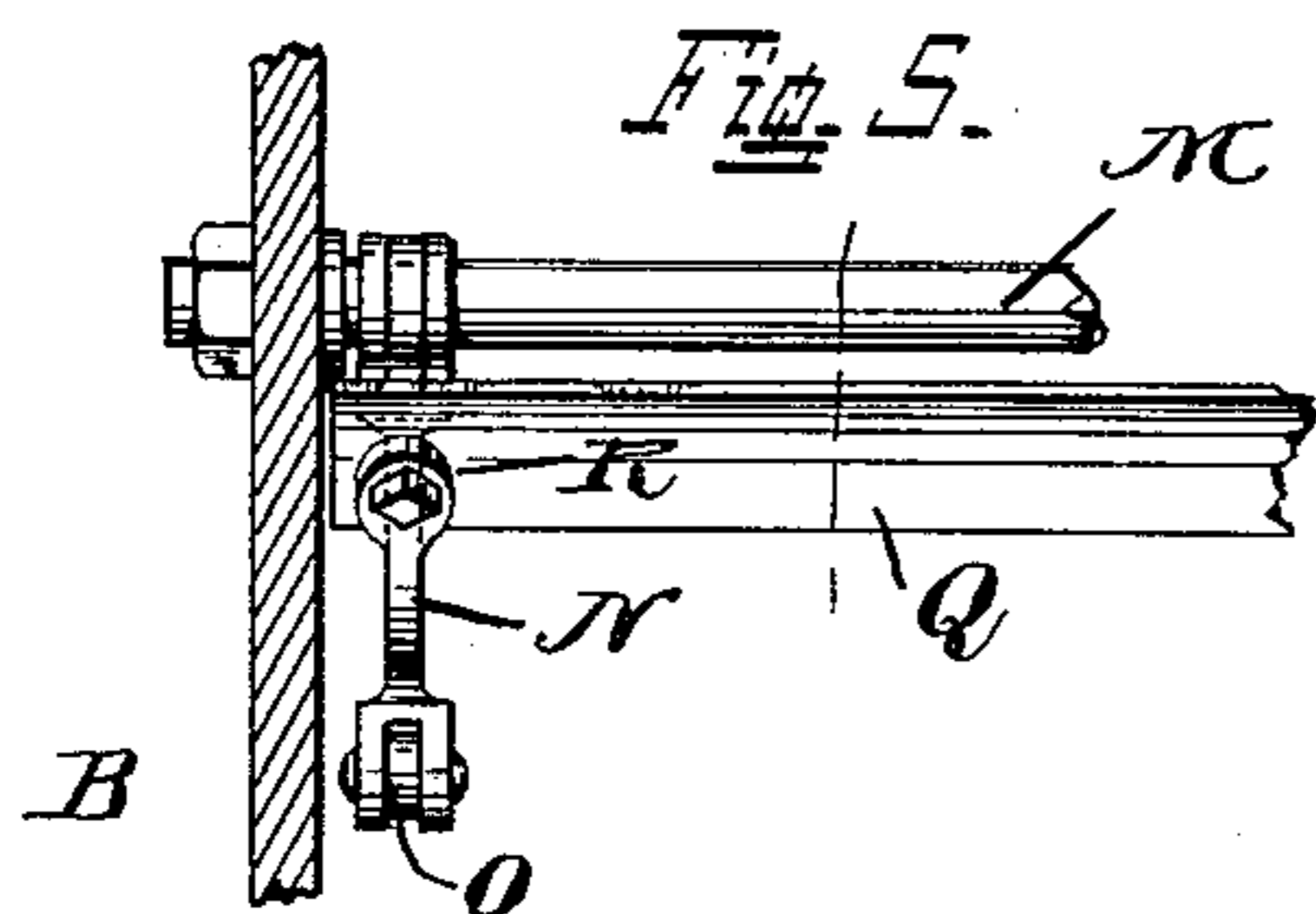
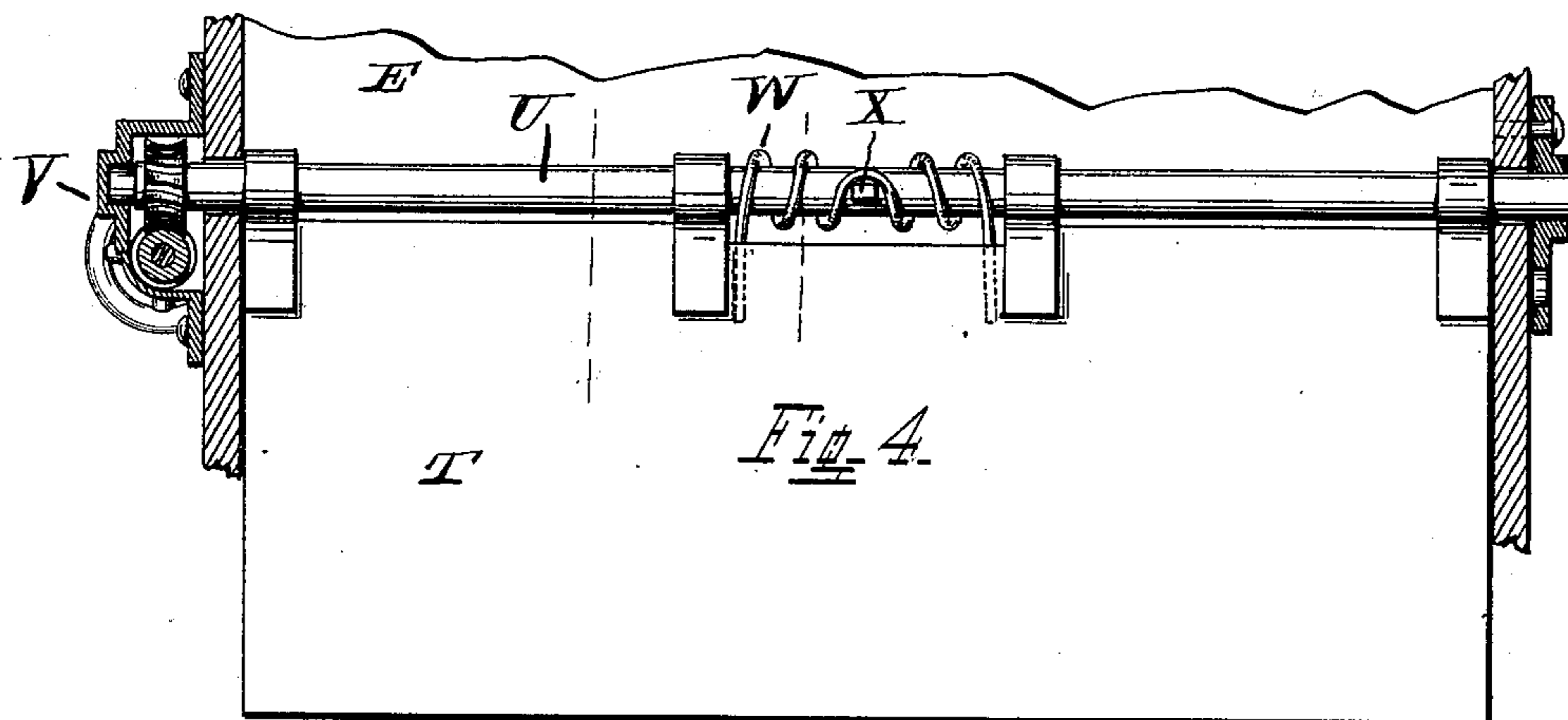
2 Sheets—Sheet 2

J. D. MAWHOOD.

ROLLER MILL.

No. 373,408.

Patented Nov. 15, 1887.



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UNITED STATES PATENT OFFICE.

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RICHMOND CITY MILL WORKS, OF SAME PLACE.

ROLLER-MILL.

SPECIFICATION forming part of Letters Patent No. 373,408, dated November 15, 1887.

Application filed January 17, 1887. Serial No. 224,534. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN D. MAWHOOD, of Richmond, Wayne county, Indiana, have invented certain new and useful Improvements in Roller-Mills, of which the following is a specification.

This invention pertains to improvements in roller-mills, and has to do with the feeding mechanism, the ventilating devices, and with the roll-scraping devices.

The improvements will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation, part vertical section, of a double roller-mill embodying my improvements, the section being taken in a plane at right angles to the axis of the rolls; Fig. 2, a side elevation at a portion of the hopper where one end of a gate-shaft is journaled; Fig. 3, an enlarged vertical transverse section of one of the gate-shafts with part of the attached gate; Fig. 4, a vertical section through a portion of the hopper and in a plane parallel with the mill-rolls, the view showing in elevation a gate-shaft and gate; Fig. 5, a vertical section through a portion of one side of the mill-frame in a plane parallel with the mill-rolls, showing in elevation portions of the scraper mechanism; Fig. 6, a view of the rear or inner face of a portion of the oscillating shaft, which reciprocates the feed-rakes; Fig. 7, a vertical section through a portion of the side of the hopper and through the central portion of the oscillating shaft, the plane of the section being parallel with the mill-rolls; and Fig. 8, a plan of a portion of one of the sides of the hopper and of the oscillating shaft, the central portion of the oscillating shaft appearing in horizontal section.

In the drawings, A indicates the frame of a double roller-mill, the same being a casting in box form, with its top open to receive the rolls and its bottom open for the discharge of ground material; B, the side walls thereof, of which there are of course two, one at each end of the rolls; C, the two pairs of rolls, journaled at the top of the frame, as usual; D, a large tube below and centrally between the two pairs of rolls, this tube reaching from side to side of

the frame and being cast integrally therewith, and having a transverse section presenting an angular roof and circular floor; E, the hopper, having the usual form and arranged, as usual, to set over the top of the mill-frame and cover the mill-rolls; F, one of the usual inner partitions reaching from side to side of the hopper, and inclined from the top thereof downward toward its pair of rolls, such partition forming, as usual, the rear wall of that portion of the hopper pertaining to one pair of rolls, the arrangement of the other pair of rolls being precisely the same; G, a partition reaching from the tube D centrally upward between the two pairs of mill-rolls, the upper portion of such partition being formed of a board reaching from side to side of the hopper, and the lower portion being formed by a web reaching from side to side of the mill-frame and cast integrally therewith, the two portions joining at about the top of the mill-frame; H, large openings in the sides of the hopper between the hopper-partitions F.

J indicates division-boards, reaching from side to side of the hopper and disposed angularly one over each inner roll of the two pairs of rolls, these division-boards reaching from near the central partition, G, upward toward the hopper-partitions F; K, an opening between upper edge of the division-board J and the rear face of the hopper-partition F; L, similar openings at the base of the division-boards where they approach the central partition, the arrangement of both openings K and L being the same for both division-boards; M, rods reaching through and from side to side of the mill-frame and disposed below and centrally between the rolls of the two pairs of rolls, one rod at each pair of rolls; N, scraper-arms loosely hung in pairs to the scraper-rods, a pair of arms at each end of each scraper-rod near the sides of the mill-frame; O, a spread-rod pivoted at one end to the lower extremity of one of the scraper-arms, the other end of the rod passing loosely through a hole in the lower extremity of the other scraper-arm of the pair, the arrangement being similar at each pair of scraper-arms; P, a spiral spring, one encircling each spread-rod between the pair of scraper-arms, one end of

the spring presenting outwardly against one of the arms, while its other end abuts against an adjusting-nut upon the spread-rod, the spring serving to separate the lower extremities of its scraper-arms; Q, scrapers attached to lugs upon the scraper-arms and arranged below the rolls, and having their upper surfaces in contact with the rolls, each scraper reaching from side to side of the mill-frame and finding a support near each of its ends at an appropriate scraper-arm; R, the face of the lugs upon the scraper-arms against which the scrapers lie, the face of these lugs being convex, so that the attachment of the scrapers to the lugs permits articulative movement; S, the usual feed-rolls, to be operated in the usual manner and disposed, as usual, across the hopper, one over each pair of mill-rolls, these rolls engaging the base of the hopper-partitions F and forming practically the narrow floors of the hopper; T, a feed gate, one for each feed-roll, the same reaching from side to side of the hopper, the lower edge of the gate closing against its appropriate feed-roll and the upper edge being pivoted to the shaft, so that the gate may be swung to and from its feed-roll; U, the gate-shafts, on which the feed-gates have their upper edges pivoted, these shafts reaching from side to side of the hopper and being journaled therein, preferably in bearings which may be adjusted to bring the shafts parallel with their respective feed-rolls; V, a worm and worm-gear at one end of each gate-shaft, the same serving as means by which the gate-shafts may be rotarily adjusted.

W indicates a spring loosely coiled about the center of each gate-shaft, the ends of the spring reaching downward into engagement with the outer surface of the gate, and serving to press the gate against its feed-roll; X, a pin projecting from each of the gate-shafts and serving to fix the heel portion of the spring against improper rotation upon its shaft; Y, a counter-shaft arranged, as usual, across the upper portion of the hopper, and intended to be rotated in the usual manner; Z, an oscillating shaft arranged horizontally against one side of the hopper and supported in bearings attached to the hopper, the axial line of this shaft intersecting the axial line of the counter-shaft Y; *a*, the rake-rods provided with the usual rake, disposed over the feed-rolls, and supported in bearings in the sides of the hopper, and fitted for reciprocation therein, as usual; *b*, the rocker-arms, one secured to each end of the oscillating shaft, and reaching downward therefrom into articulated connection with an appropriate rake-head, whereby oscillations of the shaft Z will produce reciprocations of the rake-rods and rakes; *c*, an inwardly-open cup forming the enlarged central portion of the oscillating shaft, the outer face of the cup being disposed some distance outward from the axis of the oscillating shaft; *d*, a small cylinder formed upon the outer face of the cup, this cylinder

having its axis disposed parallel with the axis of the oscillating shaft, the inner side of the cylinder communicating with the interior of the cup by a port in the common wall; *e*, a plug or piston fitted to reciprocate in the cylinder and having a diametrical bearing hole; and *f*, an eccentric-pin upon the end of the shaft Y, the end of the counter-shaft projecting outwardly through the side of the hopper into the cup of the oscillating shaft, and the eccentric-pin projecting through the slot of the cup into the bearing-hole of the plug.

The tube D forms an opening entirely across the mill-frame, and in this opening the usual counter-shaft mechanism employed in transmitting motion to the mill-rolls may be supported. The tube divides the lower portion of the mill-frame into two passages for the ground material, one below each pair of rolls, and the angular roof of the tube forms the inner sloping sides for the passages, and that portion of the central partition reaching from the top of the tube upward to the top of the mill-frame serves to divide the upper portion of the frame into two compartments, one for each pair of rolls, and the tube and this portion of the partition, being cast integrally with the frame, serve in stiffening the frame side-wise between the rolls.

The openings H serve in ventilating the interior of the mill, the heated air passing from the rolls upward through the openings K, and thence outward through the openings H. The dust carried upward by these currents of air enters the compartment between the two partitions F, and there has an opportunity of resting and settling, the settling dust moving down upon the inclined upper faces of the division-boards, and thence through the openings L into the mill-frame.

It is not necessary that any suction apparatus be connected with the openings H, and further than that it is not desirable. The heated air will pass from the openings by mere buoyancy, and the dust will not readily pass out, but will settle in the above-mentioned manner.

Each pair of scrapers is hung by its pair of scraper-arms upon its appropriate scraper-rod M. The springs P tend to separate the two arms of a pair and thus press the scrapers against the rolls with a power proportioned to the adjusting compression of the spring. The scrapers are loosely bolted to the lugs of the arms, and consequently the entire scraper system is so articulately supported that each end of each scraper adjusts itself fairly properly against its roll. The scraper-rods M are supported in holes in the sides of the mill-frame, and by withdrawing the rods the entire scraper apparatus is readily removed from the mill-frame.

Material to be ground is fed into the two divisions of the hopper in the usual manner, and the weight of the material tends to press the gates open, whereby the material is fed in a sheet-like stream to the mill-rolls, the rotating feed-rolls serving to secure a uniformity

of flow, and the reciprocating rakes serving to prevent the banking of the material over the rolls.

The worm and worm-gear arrangement serves in rotating a gate-shaft, and the rotation of the gate-shaft serves to wind up the spring W to any desired tension, so as to regulate the degree of resistance which the gate shall offer to the opening force of the material within the hopper.

By inspecting Fig. 7 it will be observed that the outward projection of the cup *c* and cylinder *d* form a horizontal lever upon the center of the oscillating shaft, such lever, in conjunction with the rocker-arms *b*, forming a bell-crank lever. As the counter-shaft Y rotates, the eccentric-pin will raise and lower the outer extremity of the horizontal lever referred to, and thereby produce oscillations of the oscillating shaft and consequently reciprocations of the rakes. The plug *e*, being free to slide in its cylinder, and being free to oscillate therein, will accommodate itself to the eccentric-pin *f*, thus causing the eccentric-pin to impart vertical vibrations to the horizontal-lever element of the oscillating shaft without binding. The cup *c* need not necessarily be cup-shaped, as its main office is to produce an outward offset in the oscillating shaft; but the cup form of such offset serves in inclosing and protecting the projecting end of the counter-shaft. The arrangement of the cylinder outside the outer face of the cup permits the ready insertion and inspection of the plug.

I claim as my invention—

1. A roller-mill comprising a mill-frame, two pairs of mill-rolls, a hopper over the same provided with partitions, as F, dividing the hopper into two hopper portions, and a chamber between such hopper portions, and provided also with openings H through the hopper-sides, leading to said chamber, and division-boards J, arranged below said openings, their tops being separated from partitions F, so as to form openings K, leading from above the rolls into such chamber, and their bottoms unconnected, so as to leave opening L, leading from such chamber into the mill-frame between the rolls.

2. In a roller-mill, the combination of a mill-frame, a pair of mill-rolls supported thereby, a scraper-rod, M, disposed centrally below the rolls and parallel therewith, two pairs of

scraper-arms, N, hung thereon, scrapers Q, supported by said arms, and a spring attached to and supported by said arms, and arranged, substantially as set forth, between the two arms of each pair and adapted to press the scrapers to the rolls, substantially as and for the purpose set forth.

3. The combination of a mill-frame, a pair of rolls, a scraper-rod supported by the frame centrally below the rolls, two pairs of scraper-arms, N, hung thereon and provided with lugs having convex faces, scrapers articulatedly secured to said lugs, a spread-rod, Q, at the extremities of each pair of scraper-arms, and a spring, P, for each pair of arms, substantially as and for the purpose set forth.

4. A feed mechanism for a mill, comprising a hopper, a feed-roll at the base thereof, a gate-shaft, a gate hung thereon, a spring attached to such gate-shaft and engaging the gate, and serving to move the gate rotarily upon the gate-shaft and press it against the feed-roll, and means, as a worm and worm-gear, for rotating the gate-shaft, and thereby adjusting the tension of said spring, combined substantially as and for the purpose set forth.

5. A mill feeding device comprising a rake fitted for reciprocation, a bell-crank shaft having one of its arms connected with such rake, a cylinder arranged at the extremity of the other arm of such bell-crank shaft, with its axis parallel with the axis of the shaft, a plug fitted for rotation and oscillation in such cylinder, and a shaft arranged at right angles to the axis of such oscillating shaft and provided with an eccentric-pin engaging a bearing in said plug, substantially as and for the purpose set forth.

6. A mill feeding device comprising a rake fitted for reciprocation, an oscillating shaft, Z, formed with the cup *c* and cylinder *d*, a rocker-arm, *b*, secured to such oscillating shaft and connected with said rake, a plug, *e*, fitted for rotation and reciprocation in said cylinder, and shaft Y, arranged at right angles to said oscillating shaft, and having its end projecting into said cup and provided with an eccentric-pin engaging a bearing in said plug, combined substantially as and for the purpose set forth.

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