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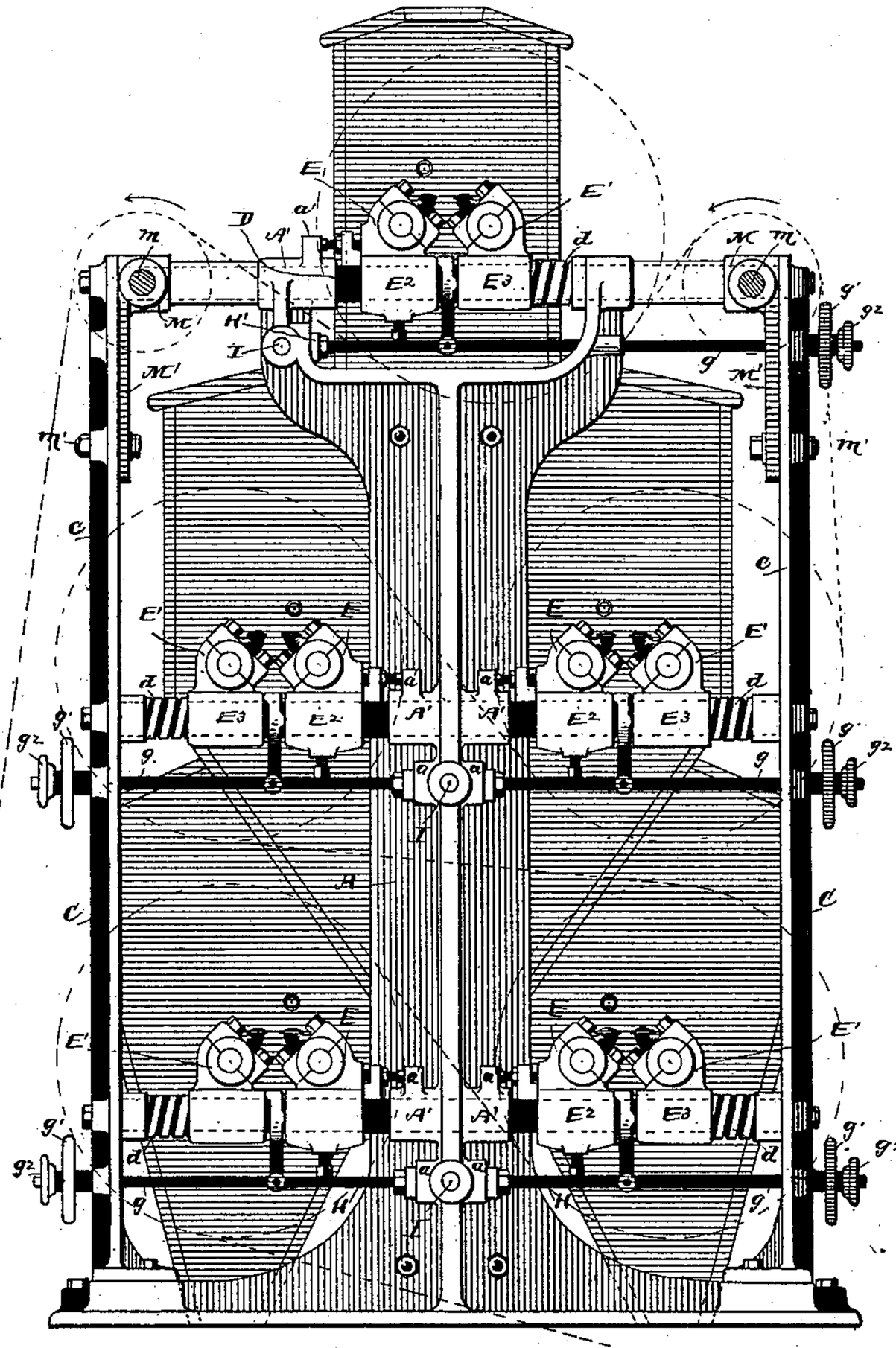

Fig. 1.

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Fig. 2.

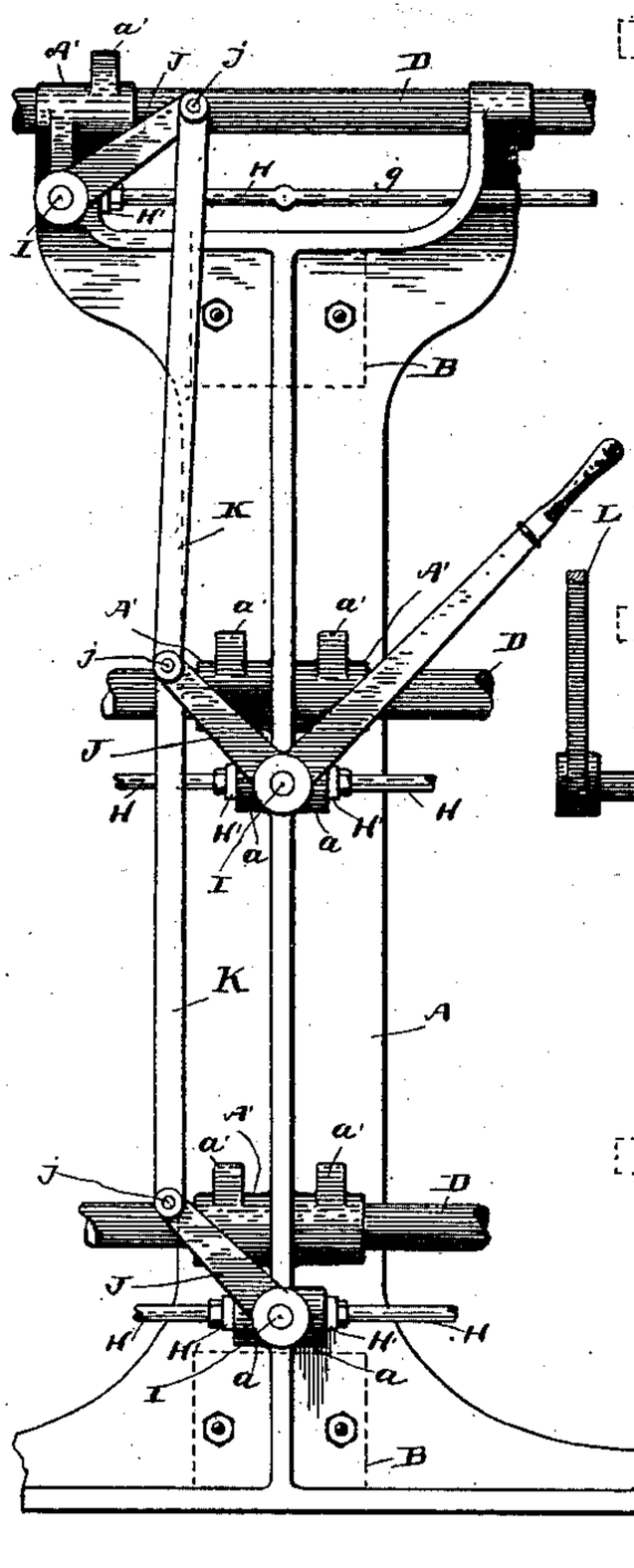

Fig. 3.

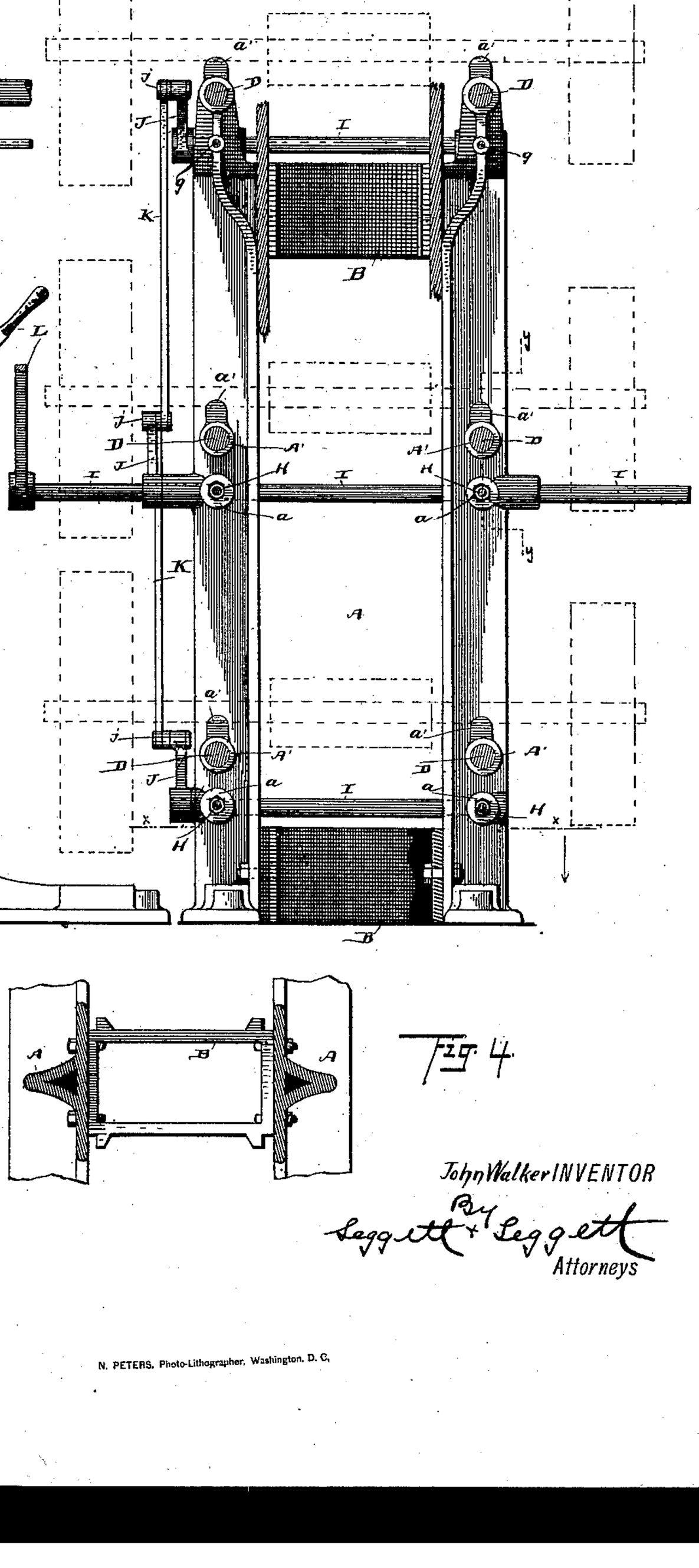

Fig. 4.

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Fig. 5.

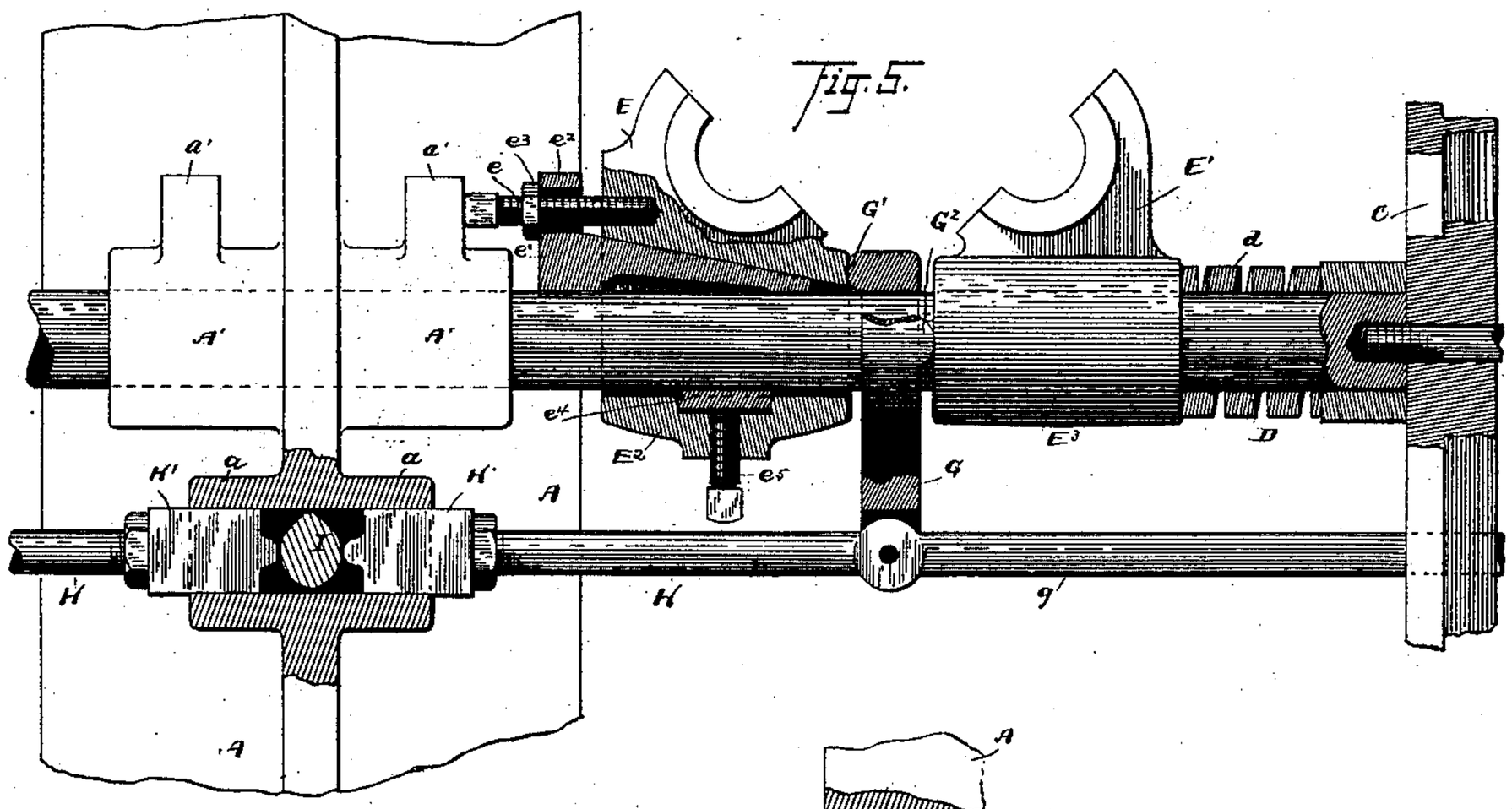

Fig. 6.

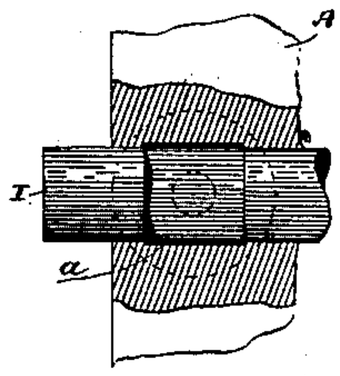

Fig. 8.

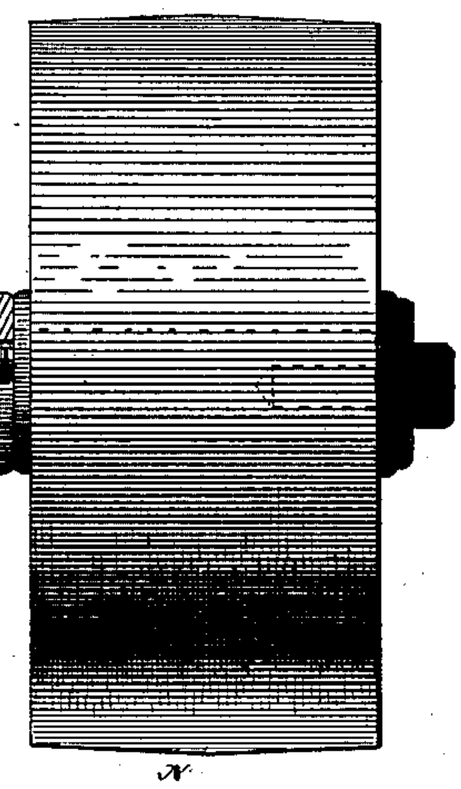

Fig. 7.

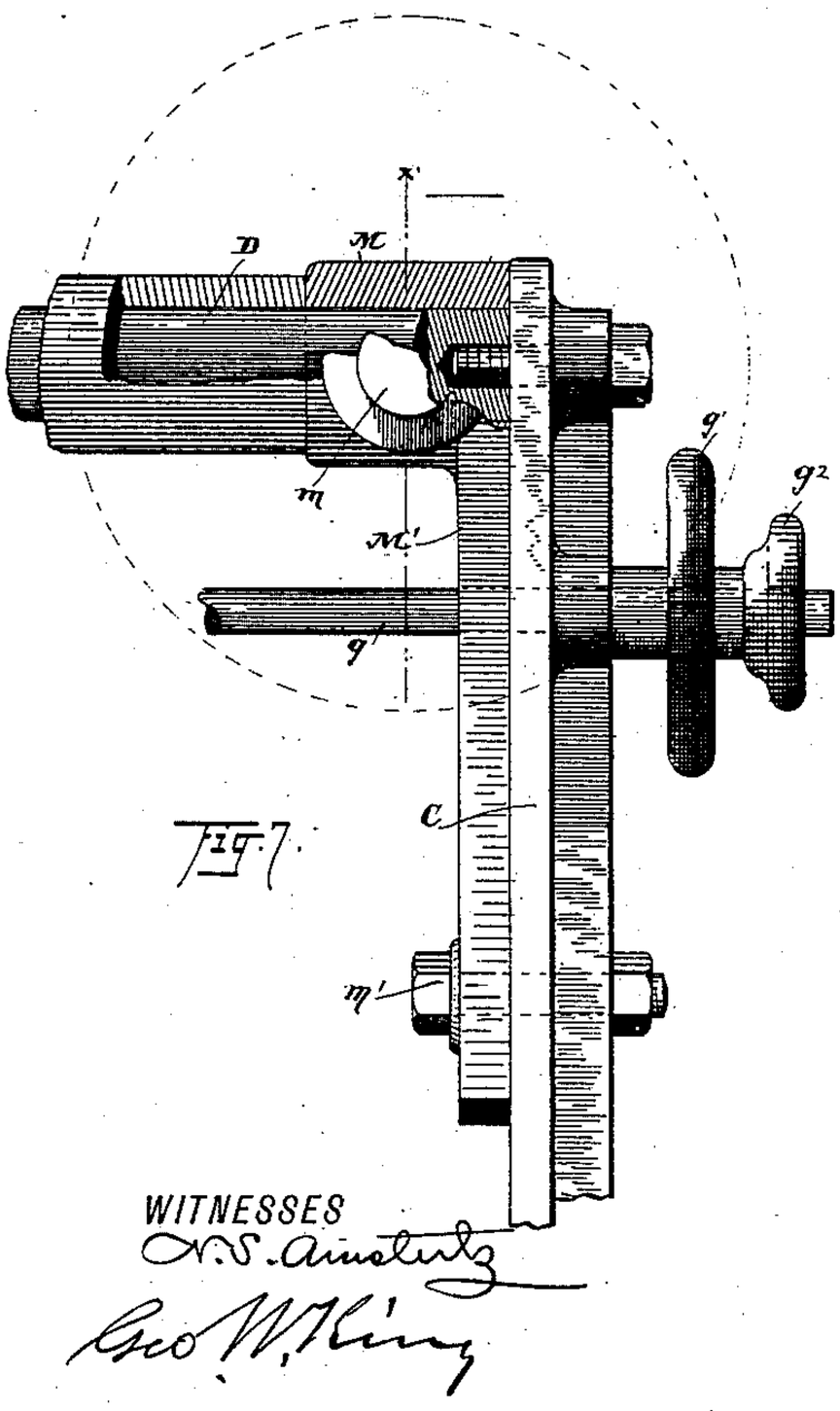

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Fig. 9.

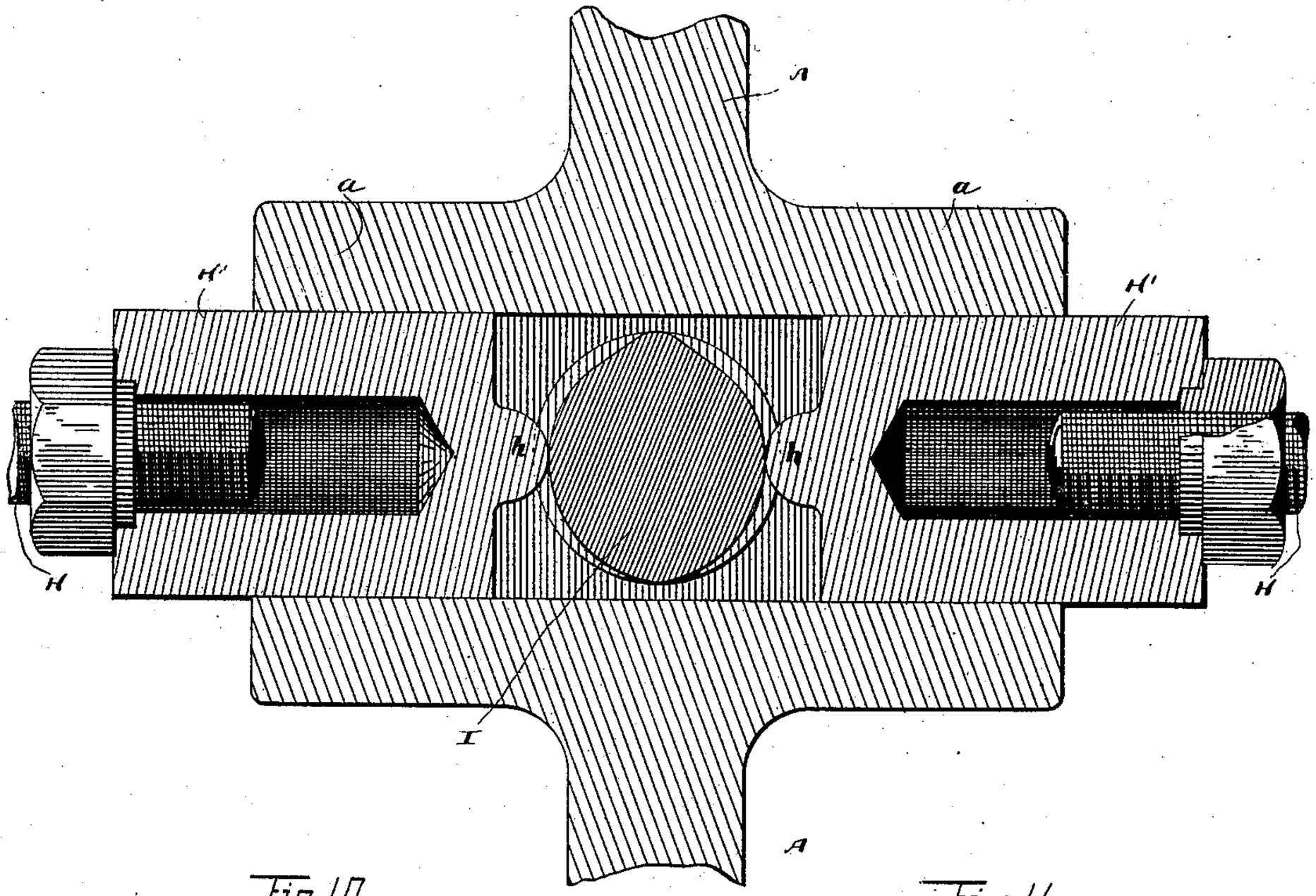


Fig. 10.

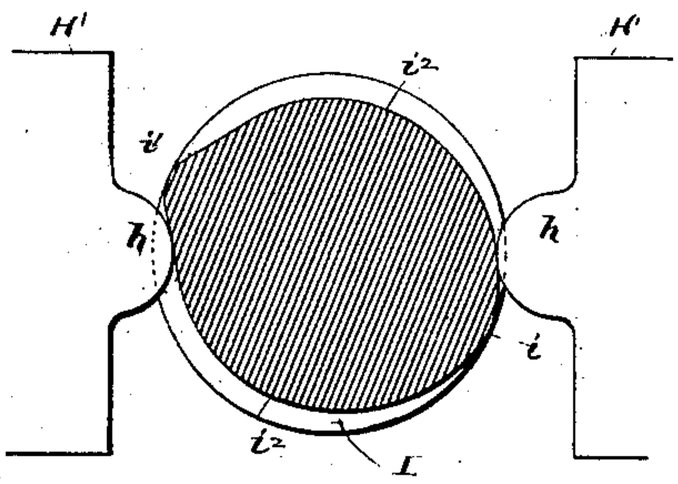
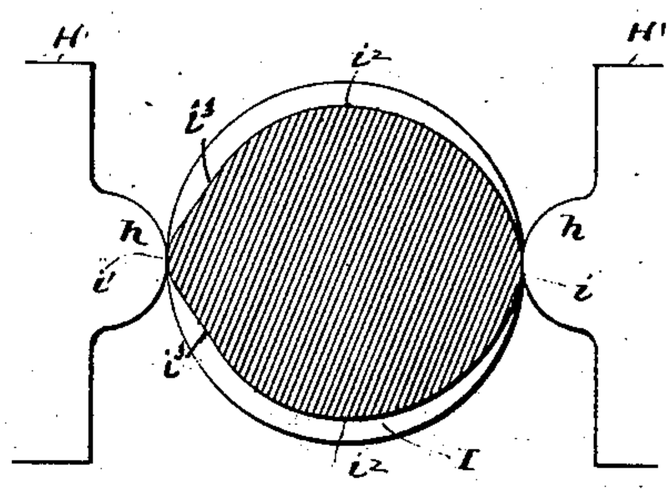


Fig. 11.



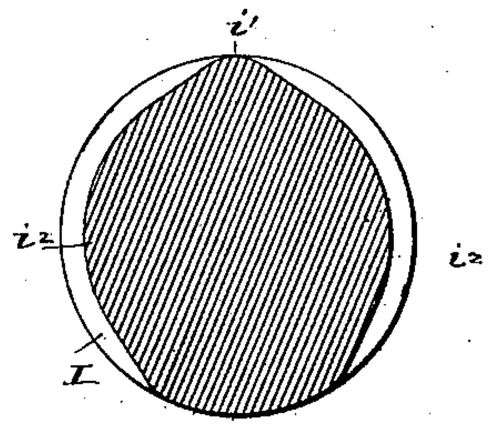


Fig. 12.

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UNITED STATES PATENT OFFICE.

JOHN WALKER, OF CLEVELAND, OHIO.

ROLLER-MILL.

SPECIFICATION forming part of Letters Patent No. 361,383, dated April 19, 1887.

Application filed May 17, 1886. Serial No. 202,438. (No model.)

To all whom it may concern:

Be it known that I, JOHN WALKER, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Roller-Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to roller-mills, and is designed more especially as an improvement on a roller-mill for which Letters Patent of the United States No. 308,131 were granted November 18, 1884, to O. A. Byrns.

My invention consists in the details of construction and combinations of parts, as will be more fully described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a roller-mill embodying my invention. Fig. 2 is an elevation showing a part of the reverse side. Fig. 3 is a vertical section. Fig. 4 is a horizontal section on the line *x x*, Fig. 3. Fig. 5 is an enlarged elevation, partly in section, showing the mechanism for adjusting and separating the rolls. Fig. 6 is a side elevation of one of the cam-rods. Figs. 7 and 8 are enlarged elevations, in detail, partly in section, taken at right angles to each other, showing the mechanism for adjusting the idle-pulley. Fig. 9 is an enlarged section, and Figs. 10 and 11 corresponding diagrammatic views, showing in detail the cam mechanism for separating the rolls. Fig. 12 shows a modification of the cam.

The roller-mill, in the main, is substantially the same as that shown and described in the aforesaid patent. Posts A, each terminating in a broad base, are secured to hollow castings B, the latter being usually rectangular in cross-section. These, together with the standards C, that are secured to the base at the corners of the machine, form the supporting-structure. Bosses A′ are cast on the outer faces and cross-wise of the posts. The bosses are bored horizontally, and receive the round rods D, the latter being connected with and supported at the ends of the standards C.

The rollers are set in pairs, the trunnions of which are journaled, respectively, in boxes E and E′. The boxes have lateral sleeves E^2 and E^3, that are mounted on the rods D. The sleeves E^3, that support the outer rollers of each pair, are bored to fit nicely and slide easily on the rods D. Each pair of rolls require accurate and relative adjustment, it being essential that their axes be kept in the same plane and parallel. The mechanism for such adjustment is as follows: The boxes E of the inner roll, on the side next the adjacent post A, have threaded holes that engage, respectively, the adjusting-screws *e*. The head of each screw abuts against a lug, *a′*, that is integral with the boss A′. By means of the screws *e* the boxes E are adjusted, as required, lengthwise of the rod D. The bore of the sleeve E^2 of one of the boxes of each inner roll is elongated in a vertical direction, and the upper wall thereof is made slightly inclined to the line of the rod D, and a wedge-shaped saddle, *e′*, is provided, having a concave lower face to fit the rod D and an inclined upper face to fit the upper wall of the sleeve.

The saddle has an upwardly-projecting ear, the same having a hole through which the screw *e* passes loosely. By means of a nut, e^3, on the screw *e*, the saddle is adjusted endwise and held in position. A recess of the sleeve on the internal face and opening upward receives the wearing-plate e^4, the latter having a concaved upper face to fit the rod D. This plate receives the thrust of the set-screw e^5, by reason of which the bar D is not injured by the set-screw. In adjusting the roll by means of the screws *e*, the inner roll is brought parallel with the opposing roll, and by turning the nut e^3 the saddle *e′* is forced in to elevate this end of the roll until the roll is brought in the same plane with the opposing roll, after which the set-screw e^5 is tightened to hold the parts rigidly. It is not necessary to have but one box, E, of a roll provided with a saddle, *e′*, as the necessary adjustment can be made at one end of the roll, and the sleeve at the other end of the roll may be bored to fit the rod D. By means of the round rod D, the boxes E and E′ adjust themselves to the trunnions of the rollers. The outer roller is pressed toward the inner roll by springs *d*, respectively mounted on the rod D between the boxes E′ and the adjacent standards C. A lever, G, the upper end of which is in the form of a collar, loosely embraces the bar D between each pair

of boxes E and E′. The lower end of the lever is pivoted to a rod, *g*, that extends out through an opening in the adjacent standard C. The outer end of the rod is screw-threaded and has hand-nuts g' and g^2 outside the standard. The lever has lugs G′ and G², arranged on opposite sides, the former being on a plane slightly above the latter.

The arrangement of parts is substantially the same as that shown in the aforesaid patent, whereby, by tightening the nuts g' and g^2, the springs *d* are compressed and the rolls separated. These hand-nuts are turned a trifle from time to time to adjust the rolls to grind coarse or fine. It frequently occurs that one or more sets of rolls of the machine are not wanted for a time, and to prevent undue wear such rolls should be separated slightly while running idle, and it is desirable to do this without loosening the adjustment had by the nuts g' and g^2; also, when the mill is shut down, as is the custom in some mills at noon and night, and in all mills (presumedly) over Sunday, the rolls of the entire mill should be separated a trifle, and should only be brought to the grinding adjustment when the rolls are in full motion and the feed is on. To this end I have devised the following mechanism: Rods H, that are preferably extensions of the rods *g*, have cross-heads H′, attached to the inner ends, that operate in ways *a* of the posts. The extreme inner ends at *h* are rounded to engage the shifting-cams that are located between the opposing ends of the rods H.

Rocking cam-shafts I pass through the machine from side to side, and each shaft has shifting-cams on each end to operate the opposing-rods H. Each shaft is preferably cut away to form the cams, by reason of which it may be drawn out endwise from its boxes in removing it from the machine.

To form the cams the shaft is cut away on opposite sides of its longitudinal center, leaving diametrically-opposite points *i i′*, preferably flush with the surface of the shaft. From points i^2, which are on a line passing transversely through the shaft midway between points *i i′* to the point *i*, the face of each cam is made eccentric to the axis of the shaft, and the incline from *i* to i^2 on both sides may be gradual. The sides of the section or point *i′* of each cam have a more abrupt incline, and from the base i^3 of these inclines to the points i^2 the shaft is cut away or formed concentric with its axis, so as to be inoperative.

The normal position of the shaft and cams is shown in Fig. 9, where the points i^2 are opposite the ends *h* of the rods H, leaving the rolls in the closed position for grinding. By turning the shaft in either direction, first one rod H is forced outward, and a still further movement of the shaft forces the opposite rod H outward, (see Figs. 10 and 11,) in which the right-hand rod is first actuated. If the shaft I were turned in the reverse direction the rod H on the left-hand side would be first moved.

It will be seen that by turning the shaft I a quarter of a revolution in either direction the two rods H are thrust outward and the two sets of rolls separated. By turning the shaft a trifle less than a quarter-revolution but one set of rolls is separated—the right or left hand set—according as the shaft is turned in one direction or the other. The mechanism for moving these cam-shafts, separately or in unison, is as follows: Arms J are connected, respectively, with each shaft I, and these arms are respectively pivoted by means of a removable pin, *j*, to a connecting-rod, K. A hand-lever, L, is connected with one of the shafts I, by operating which all of the shafts I are simultaneously actuated, and the rolls of the entire mill may be separated by one movement of the lever L. By removing a pin, *j*, the disconnected arm J may be manipulated to separate either or both of the two sets of rolls with which such arm J is connected. When the rolls are separated the rods *g* are thrust outward, and the nuts g' and g^2 are separated slightly from the standard C. When the lever K is reversed the said nuts are again brought in contact with the standards, leaving the same adjustment of the rolls that was had before such separation.

The essential features of the cams of the shafts I are that, when the shaft is turned in either direction, one cam will act before the cam on the opposite side of the shaft; otherwise the shape of the cam is not essential and may be varied considerably—for instance, the modification shown in Fig. 12 will give the same result as the cams already described.

In the patent aforesaid auxiliary or idle pulleys are shown mounted on forked brackets, the latter being rigidly secured to the posts of the mill. With such arrangement some difficulty is had in guiding the belts, from the fact that the belts do not always stretch evenly. As an improvement I make the shafts or studs on which these pulleys are journaled adjustable as follows: On the upper rods, D, that usually support but a single set of rolls, are mounted, respectively, sleeves M, the same having depending arms M′. To each sleeve is secured a laterally-projecting stud or pivot, *m*, on which is journaled an idle-pulley, N. The arms M′ extend down to the side of the adjacent standards C, and have holes elongated crosswise of the arms through which pass the securing-bolts *m′*, that secure the arms to the standard C. The arms, therefore, may be turned a limited distance laterally to tilt the shafts *m* in lining the pulley N. Holes m^2 are for the passage of the rods *g*, and these holes are elongated crosswise of the arms, and are made of such size that the rods *g* pass without contact through the arms M′.

What I claim is—

1. In a roller grinding-mill, the combination, with rods D and boxes having sleeves mounted on said rods, one sleeve of each set of boxes having a recess therein, of a wedge-shaped saddle inserted in such recess between the upper wall thereof and the rod, and means

for moving the saddle edgewise to adjust the sleeve vertically, substantially as set forth.

2. In a roller-mill, the combination, with the rods D and boxes for the roller-trunnions, said boxes having sleeves mounted on the rods D, of an adjusting-screw connected with the inner box, a wedge-shaped saddle located between the rod D and box-sleeve and provided with an upwardly-projecting ear adapted to engage a nut on the adjusting-screw, substantially as set forth.

3. In a roller-mill, the combination, with stationary and movable boxes, rollers mounted in said boxes, devices located between the boxes for moving the movable boxes away from the stationary boxes, rods connected to said devices, and a nut on each rod for holding the boxes in the desired adjustment, of the cam-shaft having double-faced cams, the said cams being located between and in engagement with the adjacent ends of the rods, and operating substantially as described.

4. In a roller-mill, the combination, with the movable and fixed rolls, mechanism for separating said rolls, and opposing rods connected with said separating mechanism, of a cam-shaft having cams for actuating said rods, said cams being double-faced, and the one cam being arranged to operate in advance of the other cam when the shaft is moved in either direction, substantially as set forth.

5. In a roller-mill, the combination, with a series of cam-shafts, each having double-faced cams arranged on opposite sides to act one in advance of the other when moved in either direction, of rock-arms connected with the respective cam-shafts, links, removable pins connecting the links, and rock-arms, whereby the cam-shafts may be moved in unison, or by withdrawing a pivotal pin the disconnected cam-shafts may be operated independent of the series of cam-shafts, substantially as set forth.

6. The combination, with rod D and standard C, of the sleeve mounted on the rod and provided with a lateral shaft and a depending arm, an idle-pulley journaled on the lateral shaft, and means for adjustably securing the depending arm to the adjacent standard C, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 19th day of April, 1886.

JOHN WALKER.

Witnesses:

CHAS. H. DORER,

A. E. LYNCH.