No. 840,879. PATENTED JAN. 8, 1907.

J. STUART.

ROLL GRINDING MACHINE.

APPLICATION FILED MAY 11, 1906.

3 SHEETS—SHEET 1.

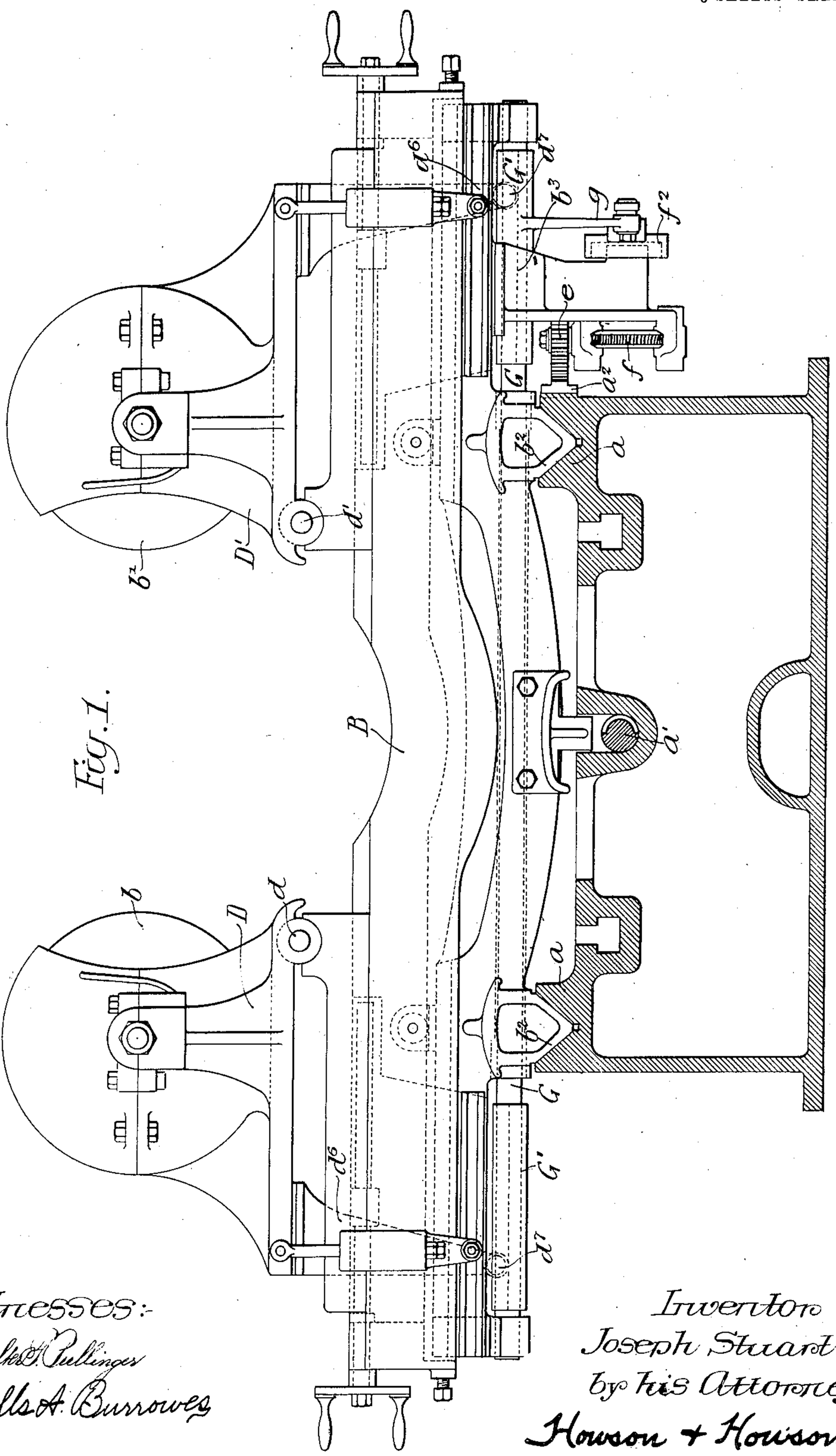

Fig. 1.

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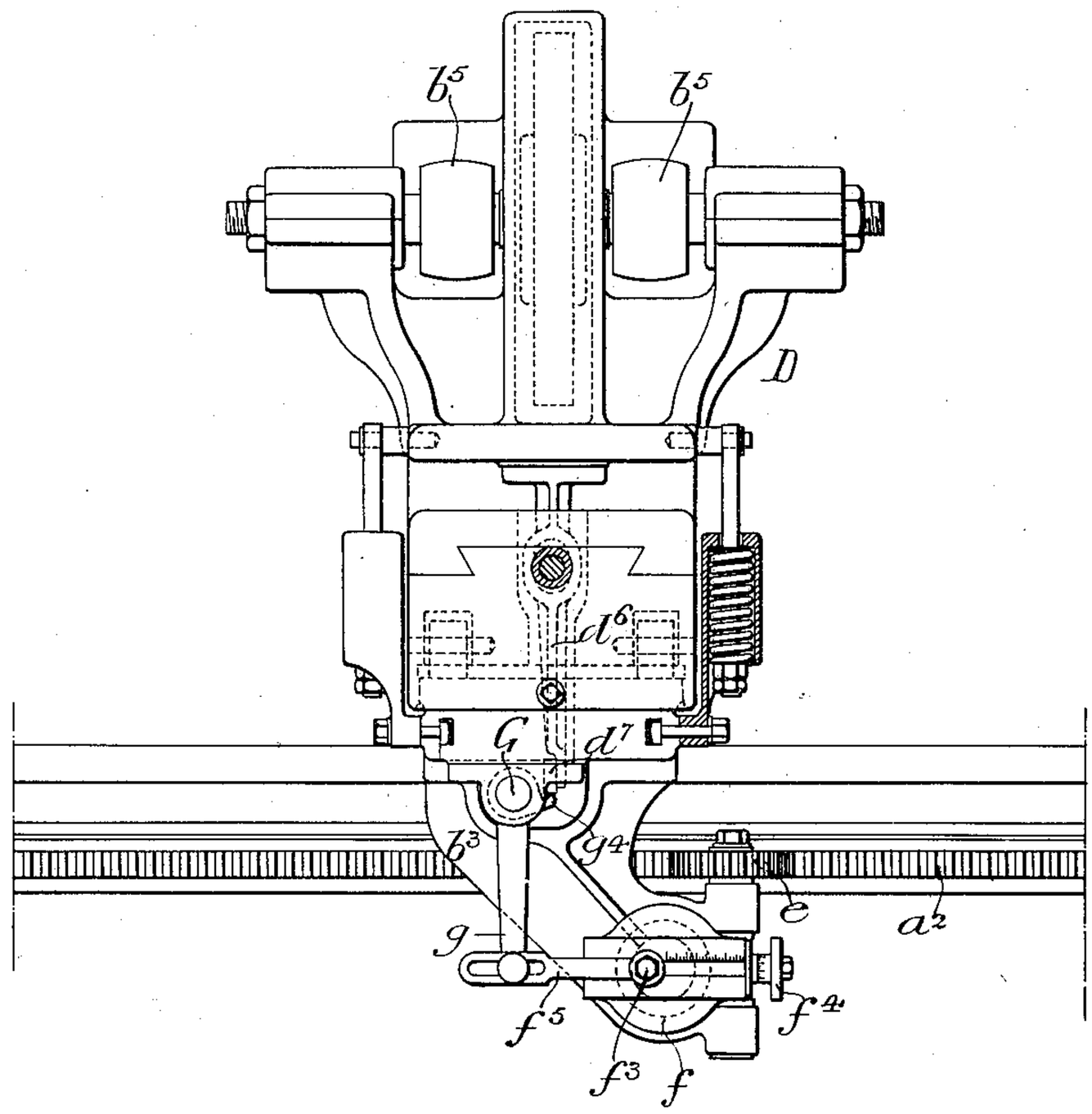
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 6.

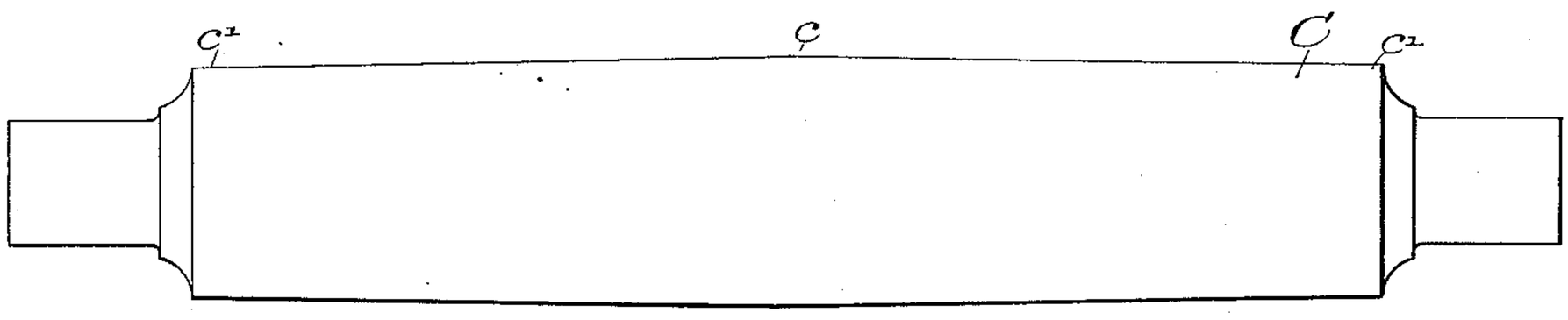


Fig. 4.

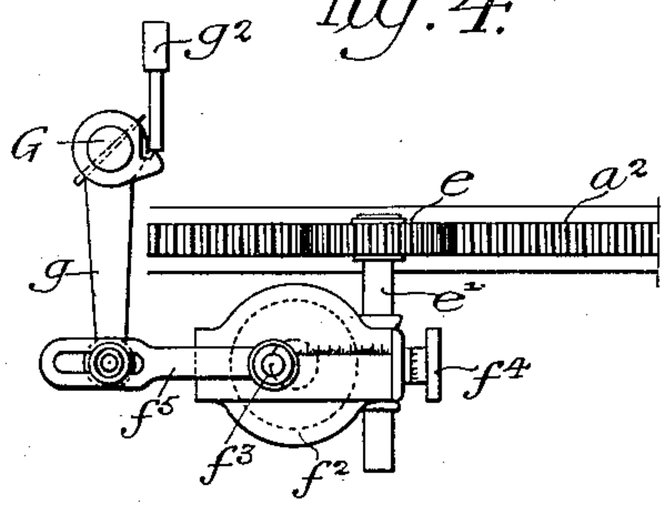


Fig. 5.

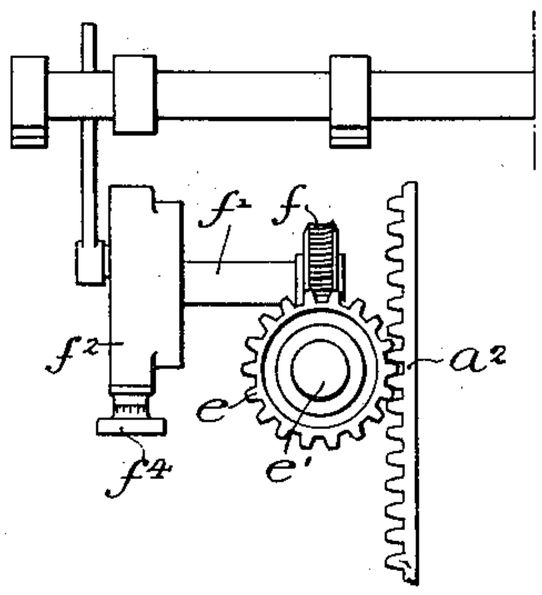
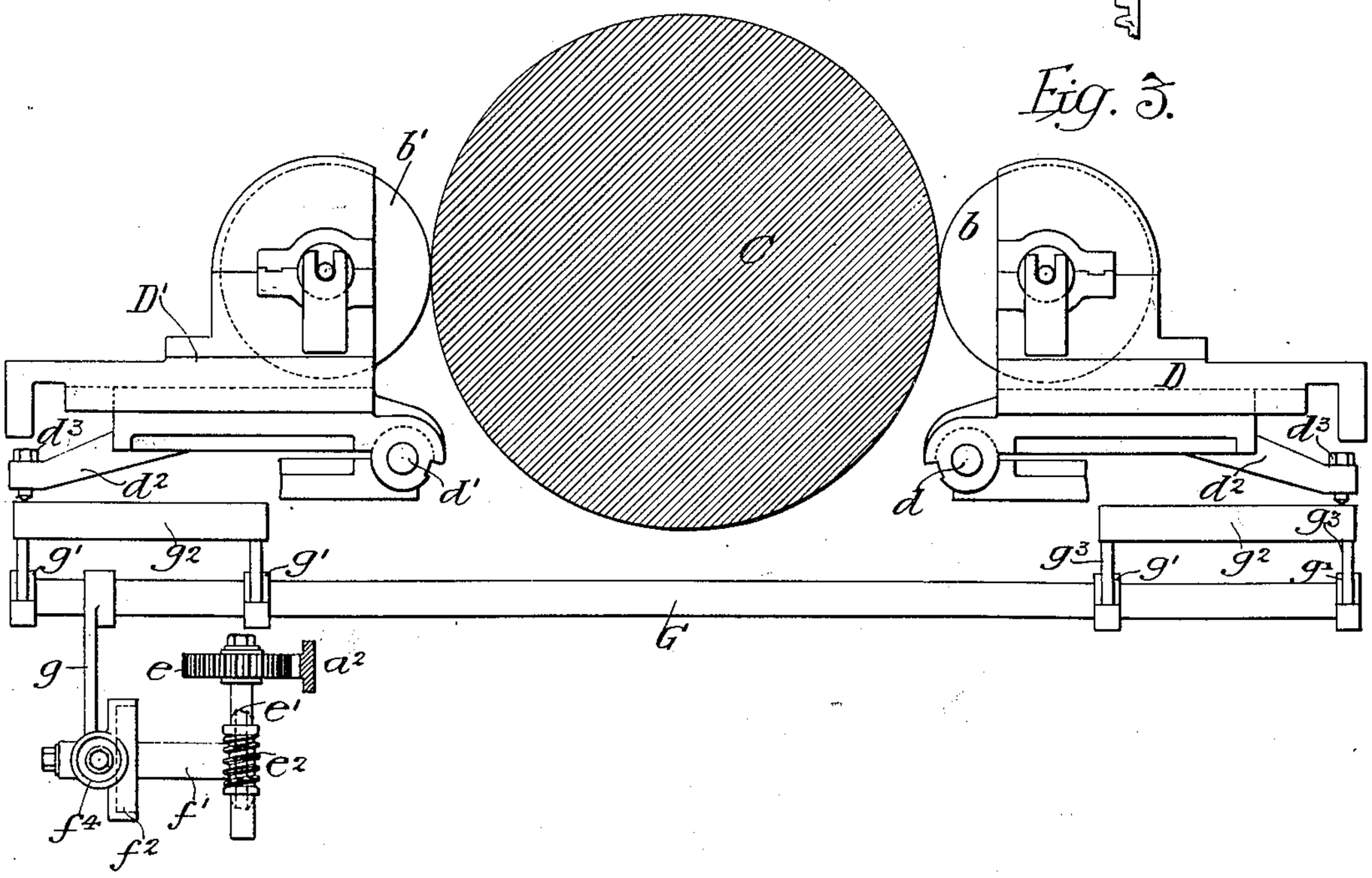


Fig. 3.



Witnesses:-

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UNITED STATES PATENT OFFICE.

JOSEPH STUART, OF WILMINGTON, DELAWARE, ASSIGNOR TO LOBDELL CAR WHEEL COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE.

ROLL-GRINDING MACHINE.

No. 840,879. Specification of Letters Patent. Patented Jan. 8, 1907.

Application filed May 11, 1906. Serial No. 316,377.

To all whom it may concern:

Be it known that I, JOSEPH STUART, a citizen of the United States, residing in Wilmington, Delaware, have invented certain Improvements in Roll-Grinding Machines, of which the following is a specification.

My invention consists in an improved device for actuating the grinding-wheels of a roll-grinding machine so that these will cause the roll operated upon to be either slightly concaved or convexed, one object of the invention being to provide adjustable mechanism capable of great accuracy and which shall be automatically operative to vary the distance of the grinding wheel or wheels from the axis of the roll, so that a predetermined concavity or convexity will be given to said roll.

I further desire to secure the above-noted results without the use of forms and by mechanism which shall be independent of the ways of the machine.

These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical transverse section of a roll-grinding machine constructed according to my invention. Fig. 2 is a side elevation of the construction shown in Fig. 1. Fig. 3 is an end elevation of a portion of another type of roll-grinding machine, showing my invention as applied thereto. Fig. 4 is a side elevation of a portion of the mechanism for adjusting the grinding-wheel shown in Fig. 3. Fig. 5 is a plan of the mechanism shown in Fig. 4; and Fig. 6 is a plan of the roll, illustrating the convexity given to it in my improved machine.

In Figs. 1 and 2 of the above drawings, A is the supporting bed or framework of a roll-grinding machine provided with longitudinal guideways a and a longitudinally-extending screw a' for traversing the carriage B for the support of the grinding-wheels. It will be understood that the roll C is supported in any desired manner by structures which have been omitted for the sake of clearness and that the grinding-wheels b and b' are driven through the pulleys b^5 from any suitable source of power. Said carriage B has guides or runners b^2, designed to fit the guideways a, and carries two wheel-supporting frames D and D′, hinged to it at d and d', respectively, so as to be movable toward and from the roll in a plane or planes at right angles to the axis thereof. The mechanism constituting my invention and shown best in Figs. 4 and 5 is designed to operate on said frames D and D′ so as to swing these on their respective hinges through predetermined distances toward and from the roll C as the carriage B is traversed upon the bed A. In accomplishing this end I provide a toothed rack a^2, extending longitudinally of the bed A, upon one side thereof, with a gear e on the framework b^3, forming part of or supported by the carriage B. This gear is carried upon a short shaft e', to which is fixed a worm e^2, which in turn meshes with a worm-wheel f, carried upon a shaft f', extending at right angles to the shaft e' and like it supported in suitable bearings in the framework b^3. Fixed to one end of this second shaft f' is a crank f^2, having a crank-pin f^3 adjustable as to its eccentricity by means of a micrometer-screw f^4. A relatively heavy shaft G extends transversely of the carriage B, being carried in suitable bearings thereon and having fixed to it near each end sleeves G′, each provided with a knife-edge g^4. Each sleeve has fixed to it an arm g, whose end is adjustably coupled to a connecting-rod f^5, which engages the crank-pin f^3 of crank f^2.

In the form of machine illustrated in Figs. 1 and 2 each of the wheel-supporting frames has an arm d^6, projecting downwardly from its outer portion and provided with a roller d^7, which bears on the knife-edge g^4. Said frames are thus supported partially by their hinges d and d' and partly by the knife-edges g^4, so that the distance of the wheels from the center of a roll operated on may be varied by turning the shaft G, and thereby raising or lowering the said knife-edge.

In the machine shown in Fig. 3 there are in addition to the arm g four collars g', fixed to the shaft G, each of which has a projecting lug formed as a knife-edge. Two of the above-mentioned collars are provided for each of the adjustable wheel-supporting structures D and D′, each of which has an arm projecting at right angles to the line of its hinge and provided with an adjusting-screw d^3. Said adjusting-screw in each in-

stance rests upon the upper surface of a bar g^2, extending parallel to the shaft G, and these bars have downwardly-projecting portions g^3, each of which rests upon one of the knife-edged lugs of a collar g'. It will be understood that the wheel-supporting structures D and D′ are movable toward and from the roll C by any desired form of mechanism commonly provided for this purpose, and the bars g^2 in this machine and the knife-edges g^4 in that form shown in Figs. 1 and 2 are caused to extend in the line of movement of said structures, so that the rear portions of the structures are properly supported at the same level irrespective of whether they are near to or far from the axis of the roll operated on. As shown in Fig. 3, the face of the crank f^2 is graduated to indicate the amount of eccentricity of the crank-pin, so that it is possible to adjust it to cause any predetermined amount of inward or outward movement of the wheels b and b' after it has been once calibrated. In the present instance the various parts above described are so proportioned that as the carriage B moves longitudinally of the bed A from one end to the other the toothed wheel e is caused to turn, owing to its engagement with the rack a^2. Said wheel thus causes movement of the crank-pin f^3 through the medium of the shaft e', worm e^2, worm-wheel f, and the shaft f', the ratio of the gearing being such that in moving from one end of the bed to the other the gear-wheel e causes an oscillation of the crank-pin through any predetermined arc. Moreover, the parts are so connected that this movement of the crank-pin first causes a relatively small turning of the shaft G in one direction and then a similar partial revolution in the opposite direction as the carriage moves from one end of the bed to the other. This permits the grinding-wheels to move through a minute distance away from the axis of the roll during the movement of the carriage B from one end of the roll to the middle thereof and then forces them a similar distance toward said axis while said carriage is moving from the center of the roll to the opposite end thereof. As a consequence the roll is of slightly larger diameter at its middle part c than at its ends c', as is desired in the case of paper-calendering rolls. It is of course obvious that the crank-pin f^3 may be so adjusted as to cause the diameter of the roll to be less at the point c than at its ends, should this be desired, as in the case of plate-metal rolls. The amount of variation in the diameter of the roll is of course determined by the eccentricity of the crank-pin, and this may be adjusted by turning the head f^4 of the micrometer-gage.

It is to be noted that by means of the fixed rack, the adjustable crank, and their associated parts any desired movements of the two wheel-carrying structures D and D′ upon their hinges may be caused, thus obviating the necessity for forms and making the operation independent of the ways of the machine, there being thus but a single actuating-rack a^2 required.

I claim as my invention—

1. The combination in a grinding-machine, of a bed, a carriage movable thereon, a grinding-wheel, a supporting structure for said wheel hinged to said carriage, with means including a fixed rack, a gear operating thereon and mechanism connecting said gear with said structure for turning the structure on its hinge to vary the distance between the wheel and the axis of the roll operated on, substantially as described.

2. The combination in a grinding-machine, of a bed, a carriage movable thereon, a grinding-wheel, a supporting structure for said wheel hinged to said carriage, with a rack fixed to the bed, a shaft having a gear meshing with the rack and also carrying a worm, a second shaft, a worm-wheel thereon meshing with the worm, an adjustable crank also on the second shaft, and means connecting said crank with the wheel-supporting structure, whereby oscillation of the crank is caused to turn said structure on its hinge and vary the distance of the grinding-wheel from the axis of the roll operated on, substantially as described.

3. The combination in a grinding-machine, of a bed, a carriage movable longitudinally thereof, a grinding-wheel, a supporting structure therefor movably mounted on the carriage, a rack on the bed, a gear engaging said rack, a crank operatively connected to the gear, and mechanism connecting said crank with the wheel-supporting structure to vary the distance of the wheel from the axis of a roll operated on as said carriage is moved upon the bed, substantially as described.

4. The combination in a grinding-machine of a bed, a carriage movable thereon, a grinding-wheel, a supporting structure therefor hinged to the carriage and also movable bodily thereon, with mechanism including gearing and a rack fixed to the bed for actuating the same, connected to turn said structure on its hinge to vary the distance between the wheel and the axis of the roll operated on irrespective of the position of said wheel-supporting structure upon the carriage, substantially as described.

5. The combination in a grinding-machine, of a bed, a carriage movable thereon, a grinding-wheel, a supporting structure therefor hinged to the carriage, a shaft having an arm fixed to it and placed to partially support said wheel structure, an adjustable crank, and gearing connected to oscillate said crank as the carriage is moved on the

bed, with means for connecting the crank and said shaft-arm, substantially as described.

6. The combination in a grinding-machine of a bed, a carriage movable thereon, a grinding-wheel, a supporting structure therefor movably supported on the carriage, means for automatically moving said structure to vary the distance between the wheel and the axis of a roll operated on, said means including a rack fixed to the bed and a gear meshing therewith, and a device for adjusting the amount of movement imparted to said wheel-supporting structure, substantially as described.

7. The combination in a grinding-machine, of a bed, a carriage movable thereon, a grinding-wheel, a supporting structure therefor hinged to the carriage, with mechanism including a crank having a movable pin, and a micrometer for adjusting the eccentricity of said pin in order to turn said structure on its hinge and thereby vary the distance between the wheel and the axis of a roll operated on, substantially as described.

8. The combination in a roll-grinding machine, of a bed, a carriage movable thereon, a grinding-wheel, a supporting structure therefor hinged to the carriage and provided with a supporting-arm, a bar extending at right angles to the axis of a roll operated on for the support of said arm, a shaft, a collar or collars fixed thereto having projecting portions for supporting said bar, an arm fixed to the shaft and a crank operative on the arm, with means including a rack fixed to the bed, and a gear-wheel meshing therewith for turning said crank as the carriage is moved upon the bed, substantially as described.

9. The combination in a roll-grinding machine, of a bed, a carriage movable thereon, two grinding-wheels placed to operate on opposite sides of the roll, supporting structures for said wheels respectively hinged to the carriage, a shaft, structures fixed thereto for respectively supporting a portion of each wheel-supporting structure, with mechanism including a rack extending longitudinally of the bed, and a gear meshing therewith for oscillating said shaft first in one direction and then in the opposite direction as the carriage is moved on the bed, substantially as described.

10. The combination in a roll-grinding machine, of a bed, a carriage movable thereon, two grinding-wheels placed to operate on opposite sides of the roll, supporting structures for said wheels respectively hinged to the carriage, a shaft, structures fixed thereto for respectively supporting a portion of each wheel-supporting structure, with a rack fixed to the bed, a gear-wheel operative on the rack, and a crank actuated by said gear-wheel and operatively connected to the shaft for oscillating the same as the carriage is moved upon the bed, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH STUART.

Witnesses:
INGERSOLL OLMSTED, Jr.,
JOS. H. KLEIN.