No. 615,383. Patented Dec. 6, 1898.

F. F. ELLIS.

POLISHING MACHINE.

(Application filed Mar. 22, 1898.)

(No Model.) 6 Sheets—Sheet 1.

Fig. 1.

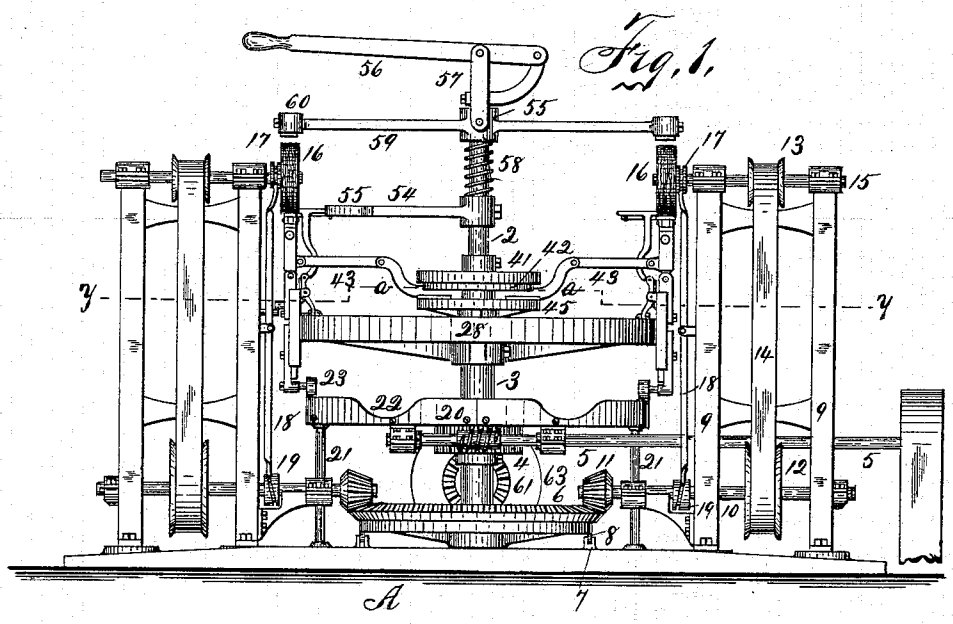
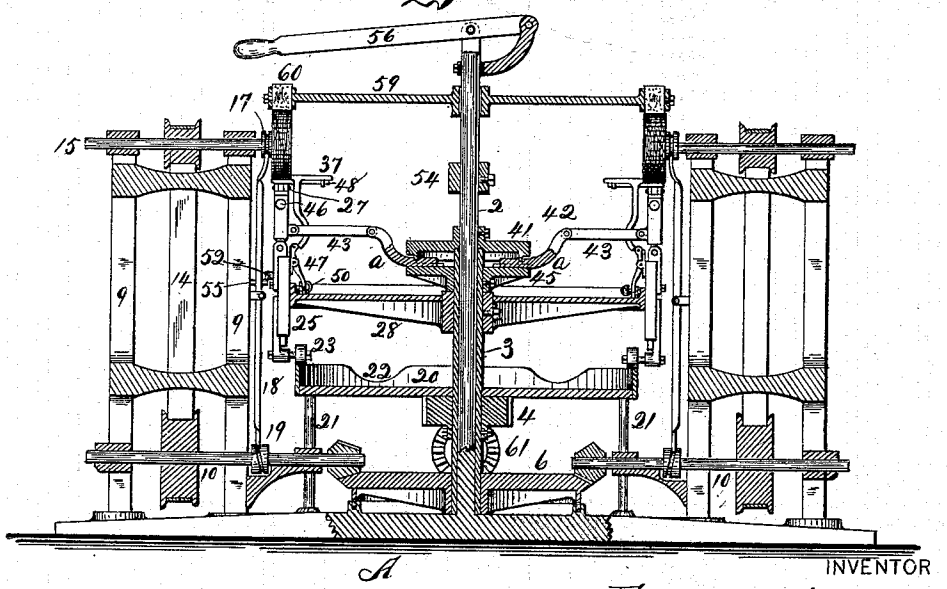


Fig. 2.



INVENTOR

Ferrand F. Ellis

BY

Smith & Davison

ATTORNEYS.

WITNESSES:

C. C. Schorneck

Mary A. Franklin

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 615,383. Patented Dec. 6, 1898.

F. F. ELLIS.

POLISHING MACHINE.

(Application filed Mar. 22, 1898.)

(No Model.) 6 Sheets—Sheet 2.

Fig. 3.

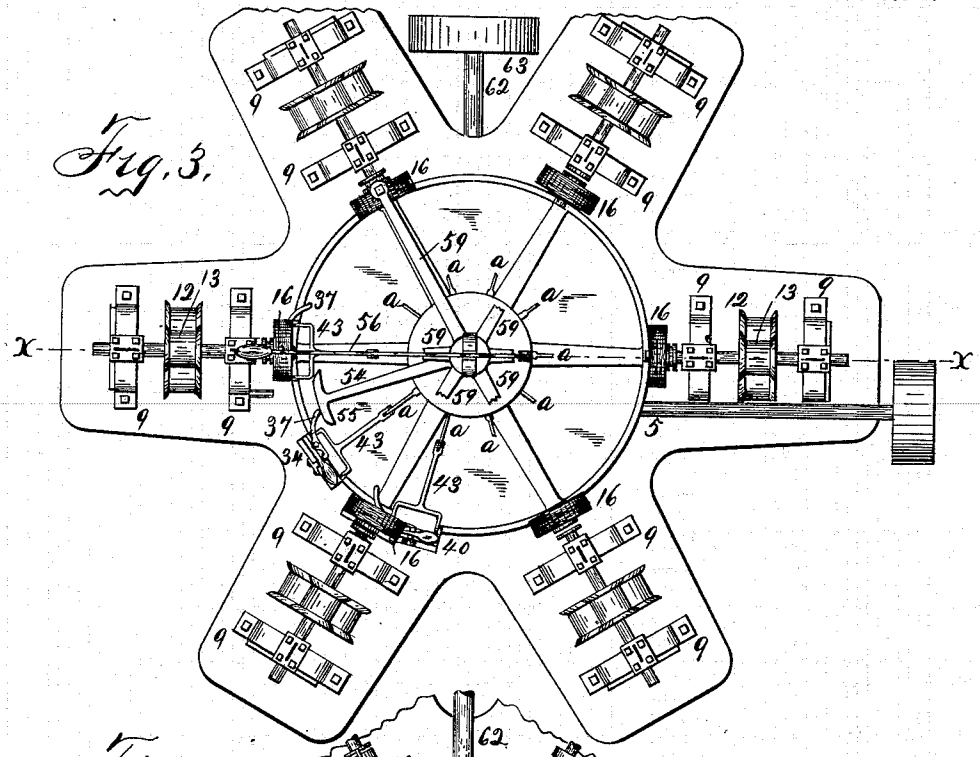
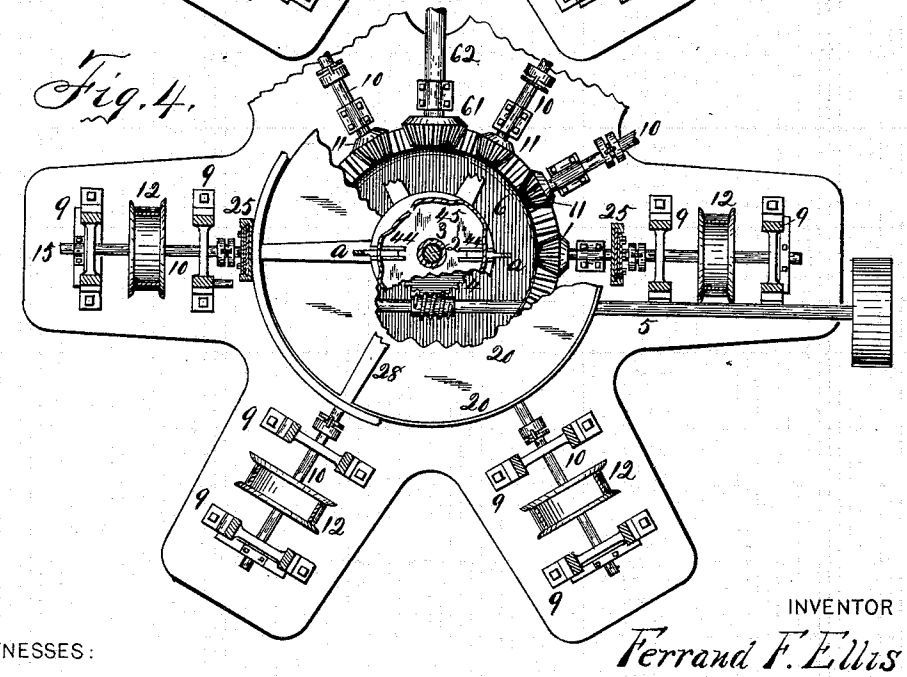


Fig. 4.



WITNESSES:

C. A. Schoeneck
Harry A. Franklin.

INVENTOR

Ferrand F. Ellis

BY

Smith & Wilson

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 615,383. Patented Dec. 6, 1898.

F. F. ELLIS.

POLISHING MACHINE.

(Application filed Mar. 22, 1898.)

(No Model.) 6 Sheets—Sheet 3.

Fig. 5.

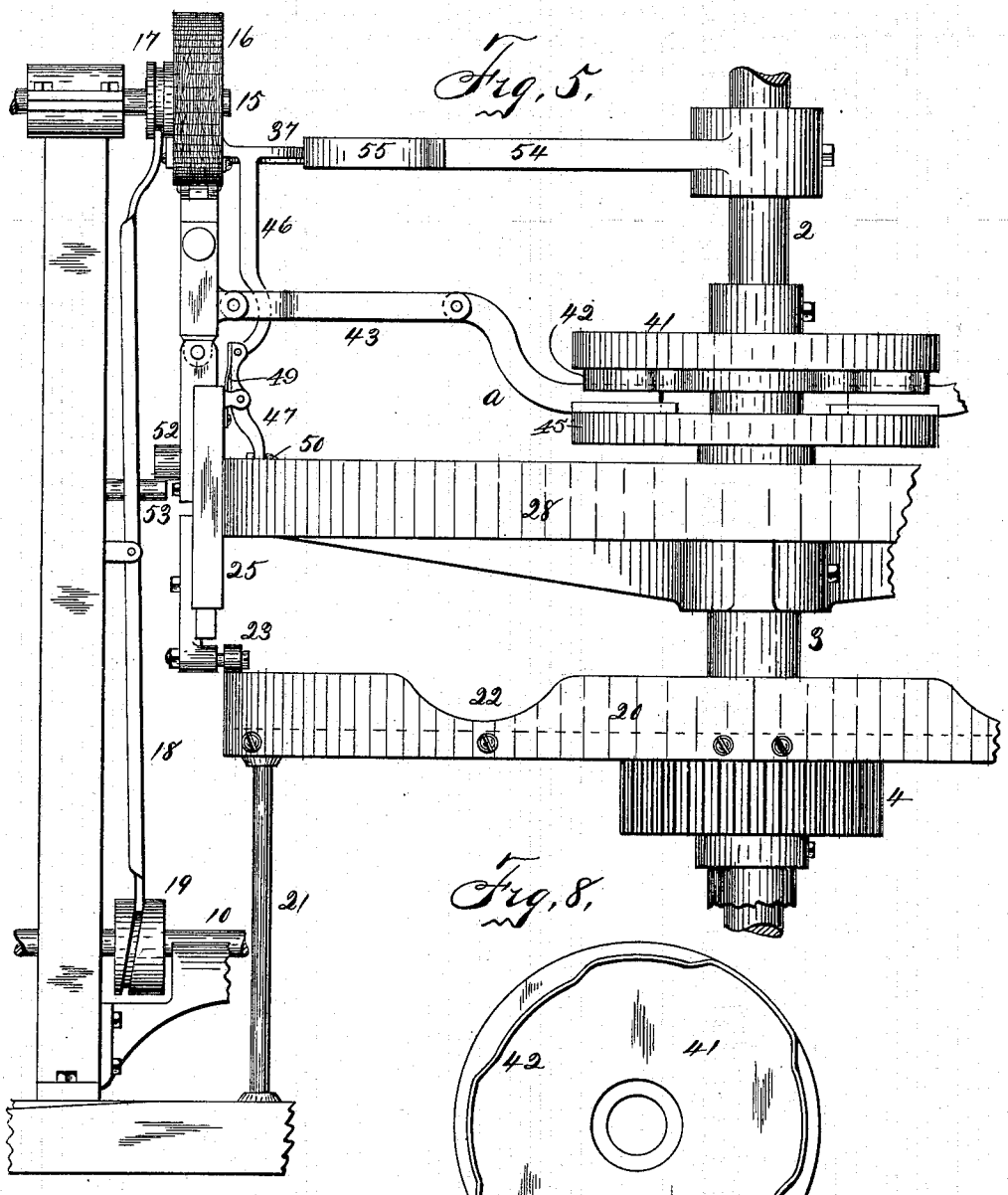


Fig. 8.

WITNESSES:

C. A. Schoenck

Mary A. Franklin

INVENTOR

Ferrand F. Ellis

BY

Smith & Denison

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 615,383. Patented Dec. 6, 1898.

F. F. ELLIS.

POLISHING MACHINE.

(Application filed Mar. 22, 1898.)

(No Model.) 6 Sheets—Sheet 4.

Fig. 6.

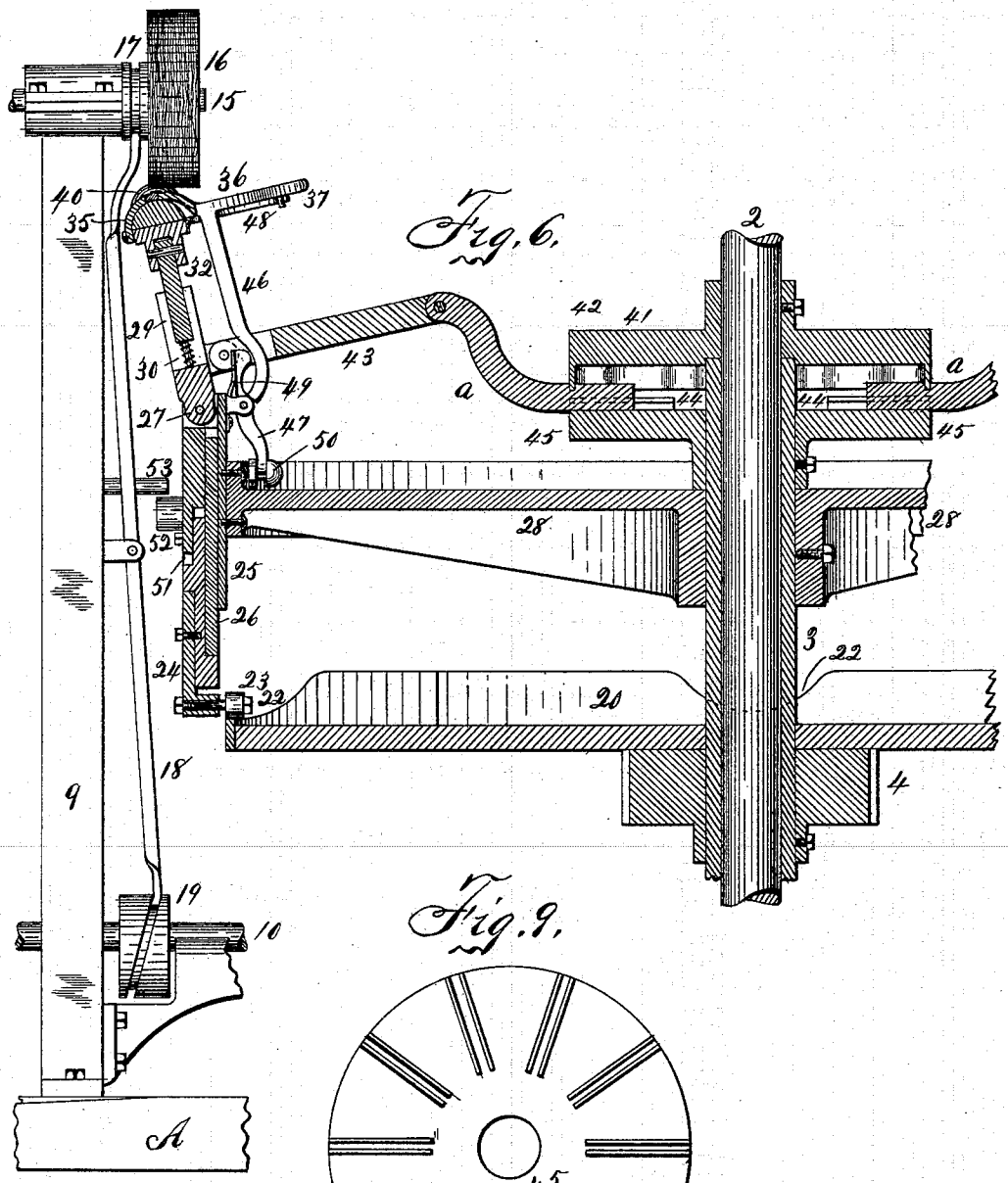


Fig. 9.

WITNESSES:

C. C. Schoeneck

Harry A. Franklin

INVENTOR

Ferrand F. Ellis

BY

Smith & Allison

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 615,383. Patented Dec. 6, 1898.

F. F. ELLIS.

POLISHING MACHINE.

(Application filed Mar. 22, 1898.)

(No Model.) 8 Sheets—Sheet 5.

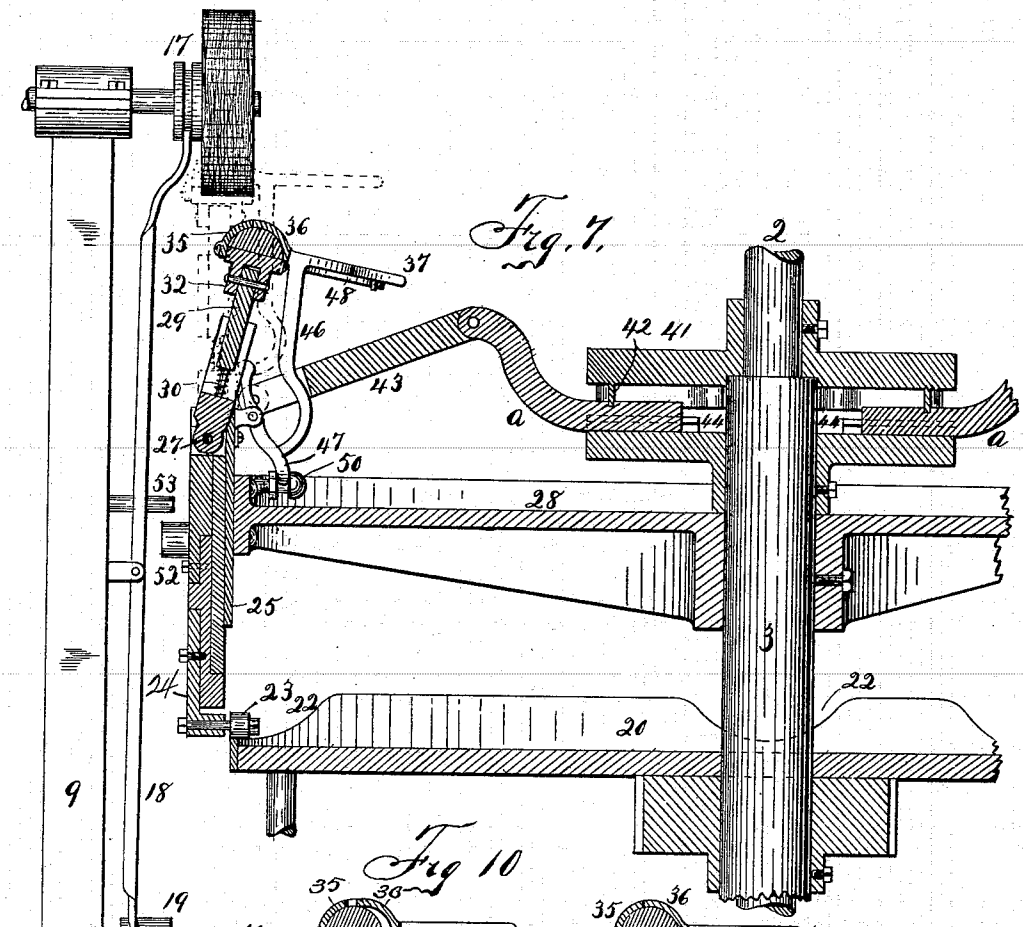


Fig. 7.

Fig 10

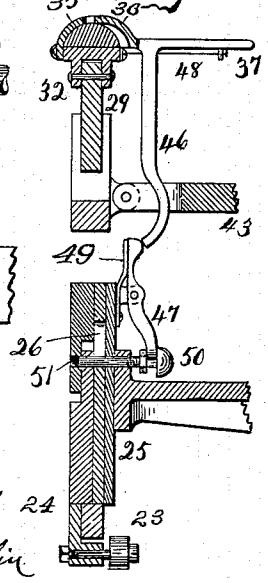
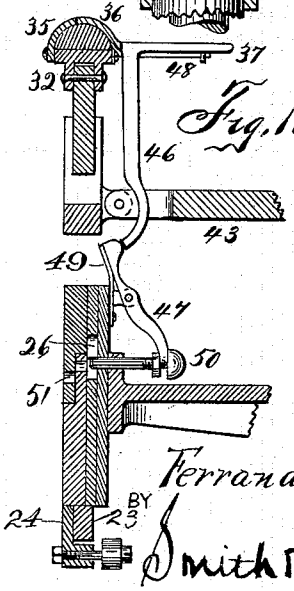


Fig. 11.



WITNESSES:

E. L. Schoeneck

Mary A. Franklin

INVENTOR

Ferrand F. Ellis

BY

Smith & Brunson

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 615,383. Patented Dec. 6, 1898.

F. F. ELLIS.

POLISHING MACHINE.

(Application filed Mar. 22, 1898.)

(No Model.) 6 Sheets—Sheet 6.

Fig. 12.

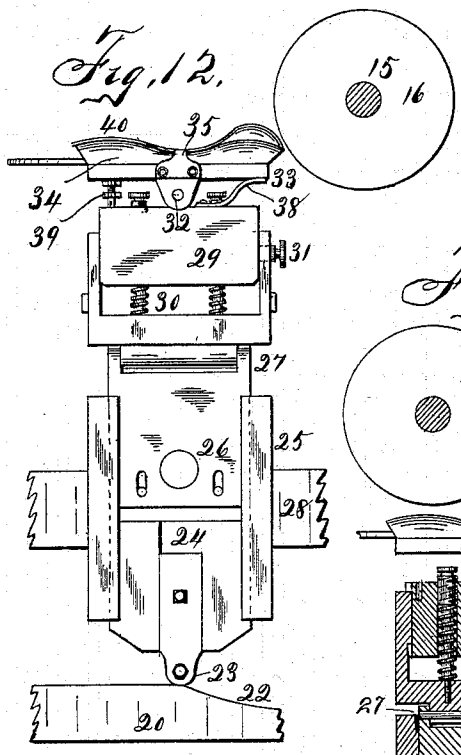


Fig. 13.

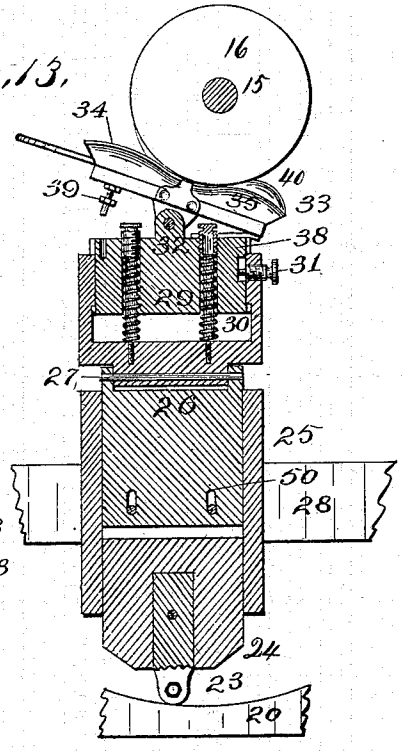


Fig. 16.

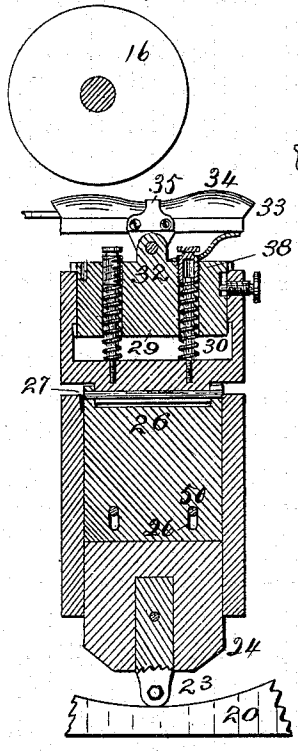


Fig. 14. a

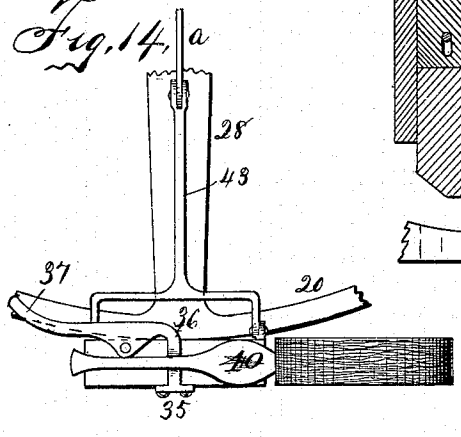


Fig. 15.

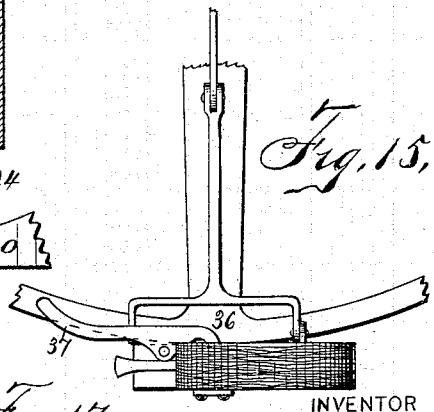
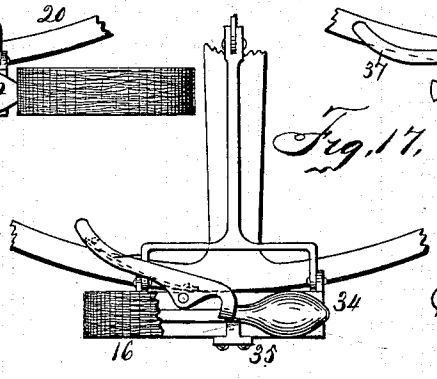


Fig. 17.



WITNESSES:

C. A. Schroeck

Mary A. Franklin.

INVENTOR

Ferrand F. Ellis

BY

Smith & Dickson

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FERRAND F. ELLIS, OF ONEIDA, NEW YORK, ASSIGNOR TO THE ONEIDA COMMUNITY, LIMITED, OF KENWOOD, NEW YORK.

POLISHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 615,383, dated December 6, 1898.

Application filed March 22, 1898. Serial No. 674,809. (No model.)

To all whom it may concern:

Be it known that I, FERRAND F. ELLIS, of Oneida, in the county of Madison, in the State of New York, have invented new and useful Improvements in Polishing-Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to polishing-machines.

My object is to produce an improved machine in which the work-holders are sectional and mounted upon the rim of a revolving wheel, the work-gripping jaws and form being mounted thereon to be automatically rocked longitudinally upon the upper or reciprocating section of said holder, which is adapted to be automatically oscillated laterally and to automatically yield and return vertically and to automatically drop out of the path of the polishers and to be automatically returned thereinto, in which the polisher-shafts are arranged upon lines radial to the circle of the work-holder wheel and are adapted to be automatically reciprocated in their bearings simultaneously with the rocking, oscillation, and vertical reciprocation of the work and work-holding grips.

It also embodies other features of construction and operation and combination of elements to carry out its purposes and accomplish the desired results.

It is constructed as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation. Fig. 2 is a vertical section of Fig. 1 on line *x x* in Fig. 3. Fig. 3 is a top plan. Fig. 4 is a section on line *y y*, Fig. 1, showing some of the central portions broken away to expose others to view. Fig. 5 is an enlarged elevation of one of the holding and polishing mechanisms, of which six are shown in Fig. 3, the parts being in their operative positions. Fig. 6 is a vertical section thereof, showing the brush moved to the left and the work-holder tilted in the same direction and passing under the brush, as in polishing the right-hand side of a convex surface. Fig. 7 is a like view of the same, showing the work-holder dropped out of engagement with the brush, as when holding no work, the dotted lines indicating its normal position. Fig. 8 is a plan of the cam for oscillating the work-holder. Fig. 9 is a plan of the guide-plate to guide the reciprocation of the cam-actuated arms. Fig. 10 is a vertical section of a work-holder, showing the jaws in position to hold work. Fig. 11 is a like view of the same, showing them closed. Fig. 12 is an elevation of a work-holder holding a piece of work and about to engage with a polisher. Fig. 13 is a sectional view of the same, showing the work passing through under the polisher. Fig. 14 is a top plan of Fig. 12. Fig. 15 is a like view of Fig. 13. Fig. 16 is a sectional view of a polisher and a work-holder passing through, under, and out of contact with it, there being no work in the jaws. Fig. 17 is a top plan of the same, the polisher being partly broken away.

A is a suitable base, upon which a spindle or post 2 is rigidly erected, and 3 is a sleeve loose upon said spindle. Upon this a drive-gear 4 is secured and driven by the worm and shaft 5 or in any other suitable manner to drive the main gear 6, also secured upon said sleeve and partly supported, steadied, and guided by a track 7 and a flange 8 on said gear or by other suitable means, which is rather essential, as this gear is quite large. At suitable points on said bed standards 9 are erected, in which drive-shafts 10 are suitably journaled to be driven by pinions 11, and by means of the pulleys 12 13 and belt 14 to drive the polishing-shafts 15, journaled upon said standards, and the brushes or polishers 16 thereon. Each brush-shaft is adapted to be reciprocated by means of a clutch member 17, a lever 18, engaging therewith, and a cam 19 upon and driven by the shaft 10. These several driving-shafts 10 and polishing-shafts are mounted upon lines radial to said main gear. Around said sleeve a stationary cam 20 is suitably mounted, as upon posts 21, as shown, and provided with recesses or cavities 22 at spaced intervals, and 23 is a roller or other traveler suitably engaging with said cam and following its contour. This roller is carried by a bar 24, mounted in ways 25, to be reciprocated to the extent permitted by the

slot and pin 26, and to this bar the work-holder is hinged, as at 27. Said ways and pins are suitably mounted upon the rim of the work-wheel 28, mounted upon and driven by said sleeve. This work-holder, Figs. 12, 13, and 16, comprises a bifurcated body having ways in which a block 29 is suitably mounted to be reciprocated, being in its normal elevated position, by the rods and springs 30, a suitable pin 31 regulating its upward projection. Upon said block a work-grip is suitably hinged, as at 32, comprising a body 33, a form 34 thereon, a stationary jaw 35, and a movable pivoted jaw 36, having an arm 37. A spring 38 at one end and a pin 39 normally hold said grip in a horizontal position, or two springs, one at each end, can be used, whereby said grip can be tilted longitudinally, as shown in Fig. 3. The hinge-joint also permits the upper part of the holder to be rocked to swing the grip laterally. Both said tilting and rocking are performed automatically.

When a piece of work, as a spoon 40, is gripped upon the form which is complementary to it, the tilting is effected by the pressure of the polishing-brush, and the brush is thereby enabled to enter the concavity of the back of the spoon between the handle and the bowl. (A spoon is here spoken of simply as an article of irregular contour and to illustrate the adaptation of the machine to work upon irregular surfaces.)

The grip is swung laterally by the following mechanism, Figs. 1, 2, 5, 6, and 7: Upon the post 2 a cam 41, Figs. 6, 7, and 8, is suitably secured, its cam-lip 42 engaging with a reciprocating pitman *a*, which is connected by a link 43 to the block which carries the grip. The pitman is seated in a radial groove 44 in a revolving guide 45, Fig. 9, secured upon said sleeve, and said work-wheel, work-holders, pitman-guides, and grip-pitman revolve together, while at the same time said pitman is reciprocated by said cam and said grip oscillated. Thus when several polishers are employed the grip will present the work in a horizontal plane to the first one at an angle in one direction to the next, as in Fig. 6, and so on, giving a different presentation to each one, while at the same time the work will yield vertically and be tilted longitudinally, all while making one revolution of the work-wheel, and whereby all parts of an irregular shape will be polished uniformly.

In Figs. 6, 10, and 14 the grip-jaws are shown open, as when gripping an article, and in Figs. 7, 11, and 17 as closed or empty.

The movable jaw 36, Figs. 5, 6, 7, 10, and 11, is provided with a leg 46, which normally engages with the upper end or head of the rocker-lever 47, which is pivoted upon the work-holder body just below the hinge 27, substantially as shown in Fig. 10, in which the jaw-spring 48 is quiescent, enabling the lever-spring 49 to throw the bolt 50 to the left into the opening 51 in the vertically-movable part of the work-holder body, and thus support it and the grip in their normal positions to bring the work into engagement with the polishers. When the work is inserted between the jaws, the foot of this leg is thrown and held away from the lever-head, thus enabling the lever-spring to act upon the bolt, and when the jaws are empty, as in Fig. 11, the jaw-spring in closing the jaws tilts the lever to withdraw the bolt and permit the movable part of the work-holder to drop out of or below the path of the polisher, particularly when the roller 23 enters a recess 22 in the cam 20, and at the same time the pitman can be so timed as to tilt the grip, as shown in Fig. 7. This protects the jaws from the action of the polishers. Then as said roller leaves said recess said work-holder is raised bodily to such a height that the pin or pin and roller 52 will suitably engage with the upper side of the stud or stud and roller 53, which will lift the movable part of the work-holder into position to permit the bolt to re-enter said opening and again support this part in its operative position.

Upon the upright 2 an arm 54 is secured, common to all of the work-holders, and provided with a wedging or cam head 55, (best shown in Fig. 3,) with which the arm 37 of each movable jaw will engage to open the grip-jaws for the insertion of work and release it to close upon and grip the work, or to wholly close against the stationary jaw. The work is usually inserted and removed while the jaws are thus automatically open, so that the revolution of work-holders is continuous.

In Figs. 1, 2, and 3 a sleeve 55 is adapted to be reciprocated by the lever 56, links 57, and springs 58 to raise and lower the arms 59 and holders 60, in which the polishing medium, as rouge, is held to supply the polishers therewith whenever desired.

I have heretofore described the gear 6 as secured upon the sleeve 3 and driven by the gear 4 and worm-shaft 5; but I have also shown in Figs. 1, 2, 3, and 4 a separate driving mechanism for the gear 6, which is therein loose upon the sleeve, comprising a bevel-gear 61, driven by a shaft 62, and power suitably applied to the pulley 63. In this construction the worm, through the gear 4, drives the work-wheel, work-holders, and pitman and cam and guides, and I am enabled to drive them at a different speed from that of the polishing mechanism, which is usually desirable.

It will be seen that the different movements of the work-holder and grip enable me to readily polish objects of irregular form.

It will be seen that the grip block or form shown in the drawings is complementary to a spoon; but it will be evident that this can be changed to be complementary to any irregular shape or can be plain, in which case

the longitudinal tilting of the form can be dispensed with. In other words, the machine, while especially adapted to polishing irregular shapes, can also be used in connection with those which are regular or plain.

It will be understood that the form can be mounted to be rocked laterally and that the polisher can be complementary to the irregular-shaped form or of any other form desired without departing from the spirit of my invention.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a polishing-machine, the combination with a polisher, of an automatically and longitudinally rocked work-grip engaging endwise with said polisher, to permit it to automatically follow the irregular lengthwise contour of an article held in the grip.

2. In a polishing-machine, the combination with a polisher, mounted in stationary bearings, of a moving work-grip rocked automatically and longitudinally by its endwise engagement with said polisher to permit it to automatically follow the irregular lengthwise contour of an article held in the grip.

3. In a polishing-machine, the combination with a polisher, of a work-grip mounted upon a rocking support and rocked automatically and longitudinally during their engagement, whereby the polisher will automatically follow the irregular contour of an article held in the grip.

4. In a polishing-machine, the combination with a polisher, of a work-holder oscillated laterally and reciprocated vertically, and a work-grip upon said holder, rocked automatically and longitudinally during and by the engagement of the work with said polisher, whereby the polisher is enabled to follow the irregular shape of an article held in the grip.

5. In a polishing-machine, the combination with a polisher mounted in a fixed plane, of a work-grip normally in a coincident plane, and means to rock, oscillate, or reciprocate said grip to vary the plane of its presentation to said polisher.

6. In a polishing-machine, the combination with a work-wheel and a plurality of work-holders mounted to rock upon supports erected upon its periphery, and means to drive it, of a plurality of revolving polishers upon shafts exterior but radial to said wheel whereby the movement of said wheel brings said holders successively under said polishers.

7. In a polishing-machine, the combination with a rotatable work-wheel and a plurality of rocking work-holders mounted upon its periphery, of a plurality of revolving polishers projecting into the path of said holders and with which they successively engage and whereby said holders are rocked longitudinally during such engagement to enable the polisher to follow irregular shapes.

8. In a polishing-machine, the combination with a rotatable work-wheel, a plurality of oscillating work-holders, and means to oscillate them laterally, of a plurality of polishers projecting into the path of said holders and successively engaging with them in whatever position they may be.

9. In a polishing-machine, the combination with a rotatable work-wheel, a plurality of oscillating work-holders upon its periphery, a plurality of pitmen connected to said holders and means to reciprocate them, of a plurality of polishers projecting into the path of said holders and successively engaging with them in whatever position they may be.

10. In a polishing-machine, the combination with a rotatable work-wheel, of a plurality of rocking, oscillating and reciprocating work-holders upon its periphery, of a plurality of polishers in the path of said holders and with which they engage successively in whatever position said holders may be.

11. In a polishing-machine, the combination with a revolving table and a work-holder thereon, of a reciprocatory polisher in the path of said holder and with which it engages in whatever position said polisher may be.

12. In a polishing-machine, the combination with a revolving table and a plurality of work-holders thereon, of a plurality of separately-reciprocated polishers in the path of said holders and with which they successively engage in whatever position said respective polishers may be.

13. In a polishing-machine, the combination with a rocking and moving work-holder, of a reciprocatory polisher with which said holder engages in whatever position said polisher may be.

14. In a polishing-machine, the combination with a revolving table, and a plurality of rocking work-holders thereon, of a plurality of reciprocatory polishers engaging with each other in whatever position they respectively are.

15. In a polishing-machine, the combination of a rocking, oscillating, vertically yielding and moving work-holder, and a reciprocatory polisher engaging with each other in whatever position they may respectively be.

16. In a polishing-machine, the combination of a revolving work-table, and a plurality of separate rocking work-holders thereon, of a plurality of separate and independently-reciprocated polishers severally engaging with the respective holders in whatever position said holders and polishers may respectively be.

17. In a polishing-machine, the combination of a moving work-holder, a cam engaging therewith to vertically reciprocate it, and a reciprocatory polisher engaging with each other in whatever position they may respectively be.

18. In a polishing-machine, the combination of a rocking and moving work-holder, a cam

engaging therewith to vertically reciprocate it, and a polisher with which said holder engages.

19. In a polishing-machine, the combination of a rocking and moving work-holder, a cam engaging therewith to vertically reciprocate it, and a reciprocatory polisher engaging with each other in whatever position they may respectively be.

20. In a polishing-machine, the combination of a revolving work-table, a rocking and oscillating work-holder thereon, a pitman connected to said holder, and a cam reciprocating said pitman, with a reciprocating polisher engaging with said work-holder in whatever position each may be.

21. In a polishing-machine, the combination of a revolving work-table, ways thereon, and a work-holder mounted therein, of a cam engaging with the lower end of said holder to reciprocate it in said ways.

22. In a polishing-machine, the combination with a work-holder consisting of sections detachably connected together and held apart by such connection, of a cam engaging with the lower section to reciprocate the holder whether the sections are separated by said connection or not.

23. In a polishing-machine, the combination with a work-holder consisting of three sections, a central one, an upper one hinged thereto, and a lower one connected thereto to slide thereon, and held apart therefrom by a removable connection, of a cam engaging with said upper section to oscillate it, and a second cam engaging with the lower section to reciprocate the entire holder, whatever relation the parts may bear to each other.

24. In a polishing-machine, the combination of a polisher, in a stationary plane, of a sectional work-holder having its upper end normally in a position to engage with said polisher and means to disconnect said sections to permit the automatic shortening of said holder to bring its upper end into non-engaging position relative to said polisher.

25. In a polishing-machine, the combination with a polisher, of a work-holder automatically rocking longitudinally and automatically yielding vertically through its impact with said polisher.

26. In a polishing-machine, the combination with a polisher and a work-table, of a work-holder mounted therein, automatically-operated jaws thereon, and means whereby when said jaws are empty said holder is automatically tilted out of the plane of said polisher.

27. In a polishing-machine, the combination with a polisher, work-table, and ways thereon, of a work-holder consisting of an upper and a lower section hinged together, the lower section being mounted in said ways, automatically-operated jaws upon the upper section and means whereby when said jaws are empty said upper section is automatically tilted to throw said jaws out of the plane of said polisher.

28. In a polishing-machine, the combination with a work-table, and a work-holder thereon, of automatically opened and closed jaws upon said holder.

29. In a polishing-machine, the combination with a polisher, a work-table, and a work-holder mounted thereon, of a pair of automatically-operated work-holding jaws upon said holder, and means to automatically shift said jaws when empty, out of the plane of said polisher.

30. In a polishing-machine, the combination with a polisher, a work-table, and a rocking work-holder mounted thereon, of a pair of automatically-operated work-holding jaws upon said holder, and means to automatically remove said jaws when empty, from the plane of said polisher, and to restore them to it when holding work to be polished.

31. In a polishing-machine, the combination with a polisher, of work-holding jaws upon a rocking support normally in the plane of said polisher, and means whereby they are shifted out of said plane as soon as the work is removed from them.

32. In a polishing-machine, the combination with a polisher, of work-holding jaws upon a rocking work-holder mounted upon a rocking support and means to automatically remove them from the plane of said polisher when empty, and to return them to it when filled.

33. In a reciprocatory polishing-machine, the combination with a polisher, of automatically-opened work-holding jaws, mounted upon a rocking support and means to automatically shift them into or out of the plane of said polisher.

34. In a polishing-machine, the combination with a work-table, a rocking work-holder and work-holding jaws thereon, of an arm automatically engaging with one of said jaws to open it for the insertion or removal of work.

35. In a polishing-machine, the combination with a work-table, a work-holder and work-holding jaws thereon, of a polisher, and an arm automatically engaging with one of said jaws to open it for the insertion or removal of work.

36. In a polishing-machine, the combination with a revolving work-table, multiple work-holders mounted thereon, work-gripping jaws on said holders, and multiple polishers with which said jaws successively engage, of a stationary arm successively engaged by the movable member of said jaws and whereby each jaw is opened for the insertion or removal of work.

37. In a polishing-machine, the combination with a revolving work-table, and a series of work-holders mounted thereon, of a series of polishers in the path of and successively engaged by said work-holders, and a series of vertically-reciprocated receivers of polishing

material from which said polishers are supplied.

38. In a polishing-machine, the combination with a revolving work-table, and a series of work-holders mounted thereon, of a series of polishers in the path of and successively engaged by said work-holders, a series of arms mounted, radiating from, and reciprocating upon the stationary pivot of said table, a receiver upon each arm holding the polishing material, and means to bring each receiver into contact with a polisher to supply it with the polishing medium.

In witness whereof I have hereunto set my hand this 9th day of March, 1898.

FERRAND F. ELLIS.

In presence of—
O. D. WRIGHT,
W. HECTOR GALE.