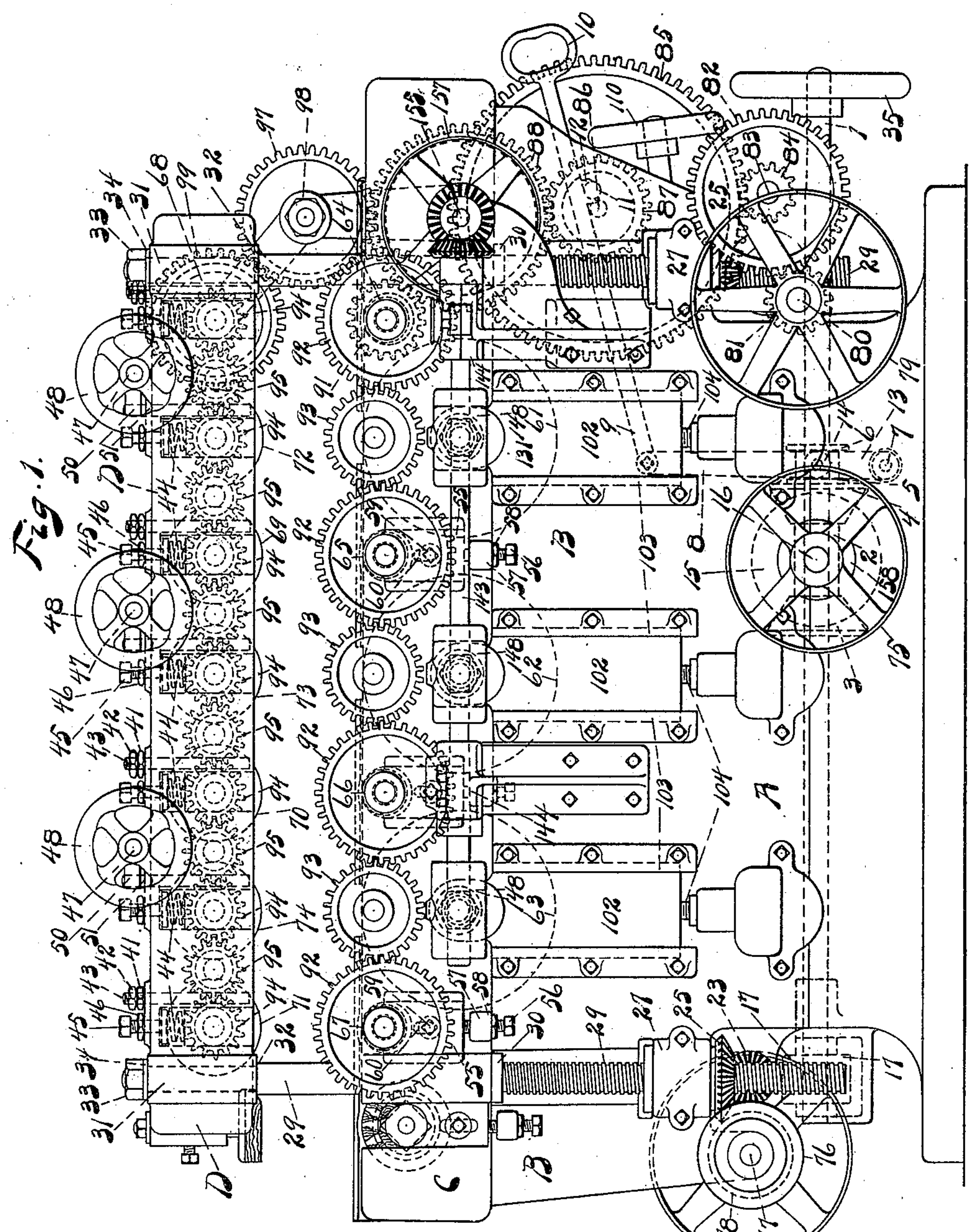
No. 645,578. Patented Mar. 20, 1900.

J. R. THOMAS.

ABRADING MACHINE.

(Application filed May 1, 1899.)

(No Model.) 5 Sheets—Sheet 1.



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

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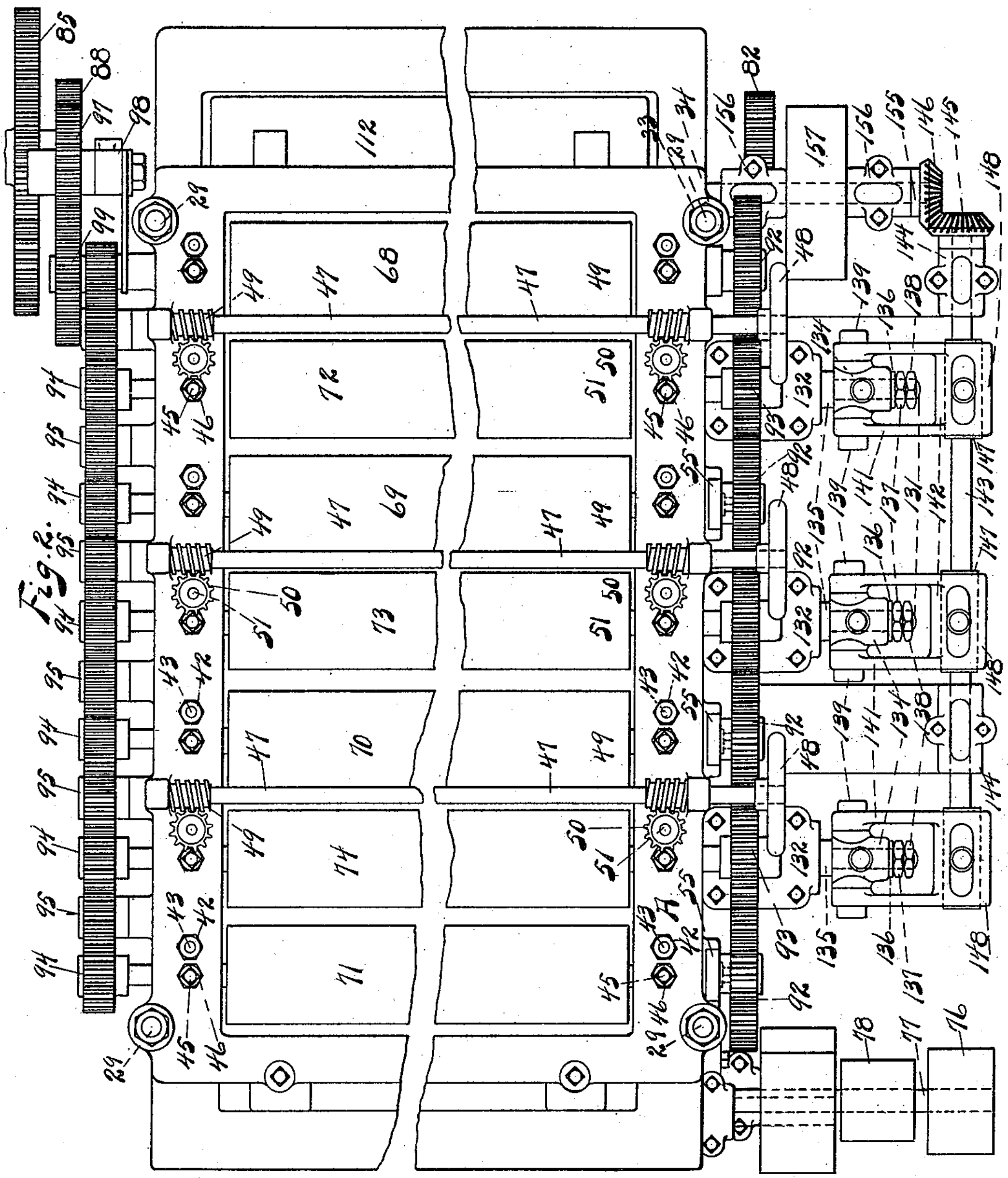

Fig. 2.

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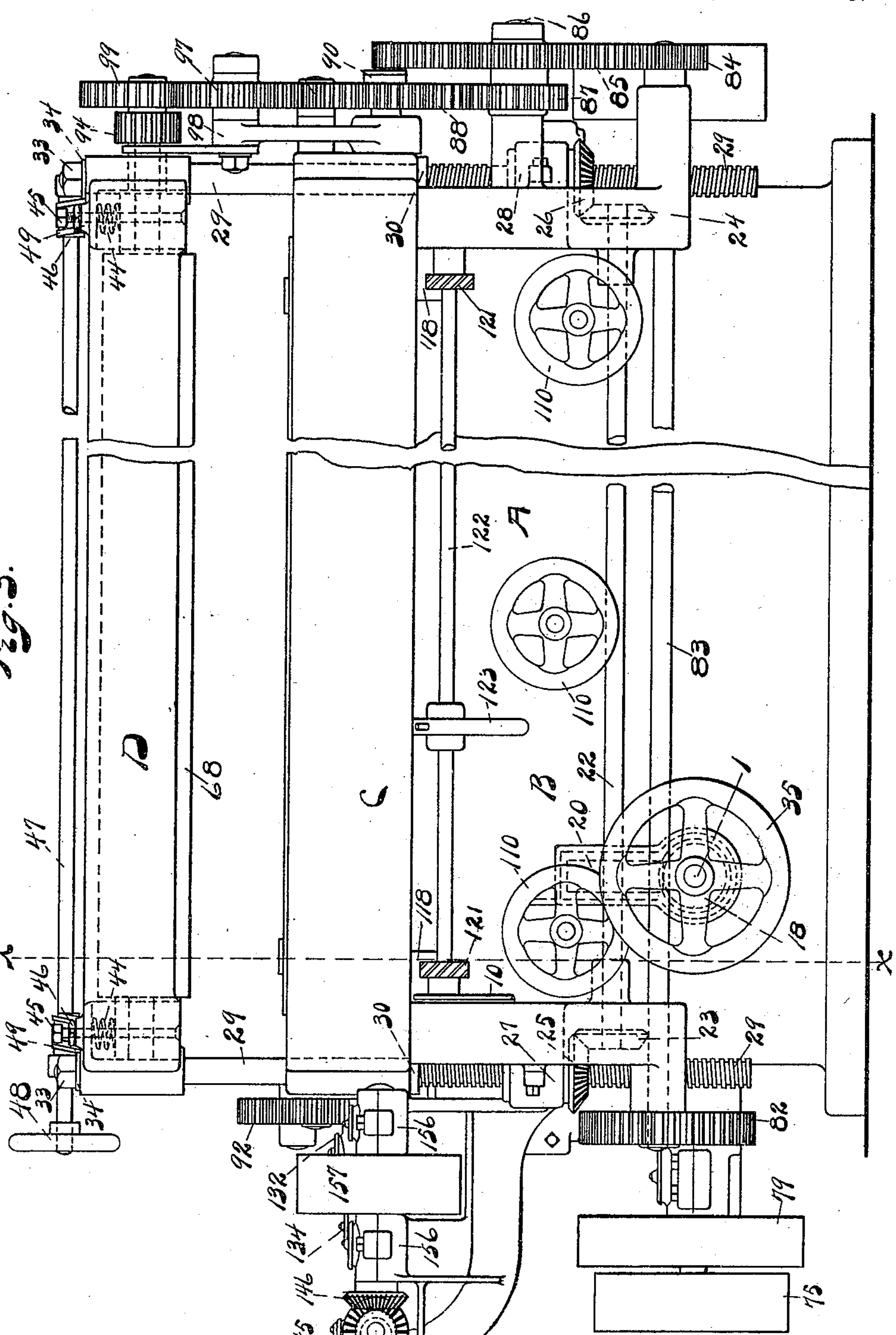

Fig. 3.

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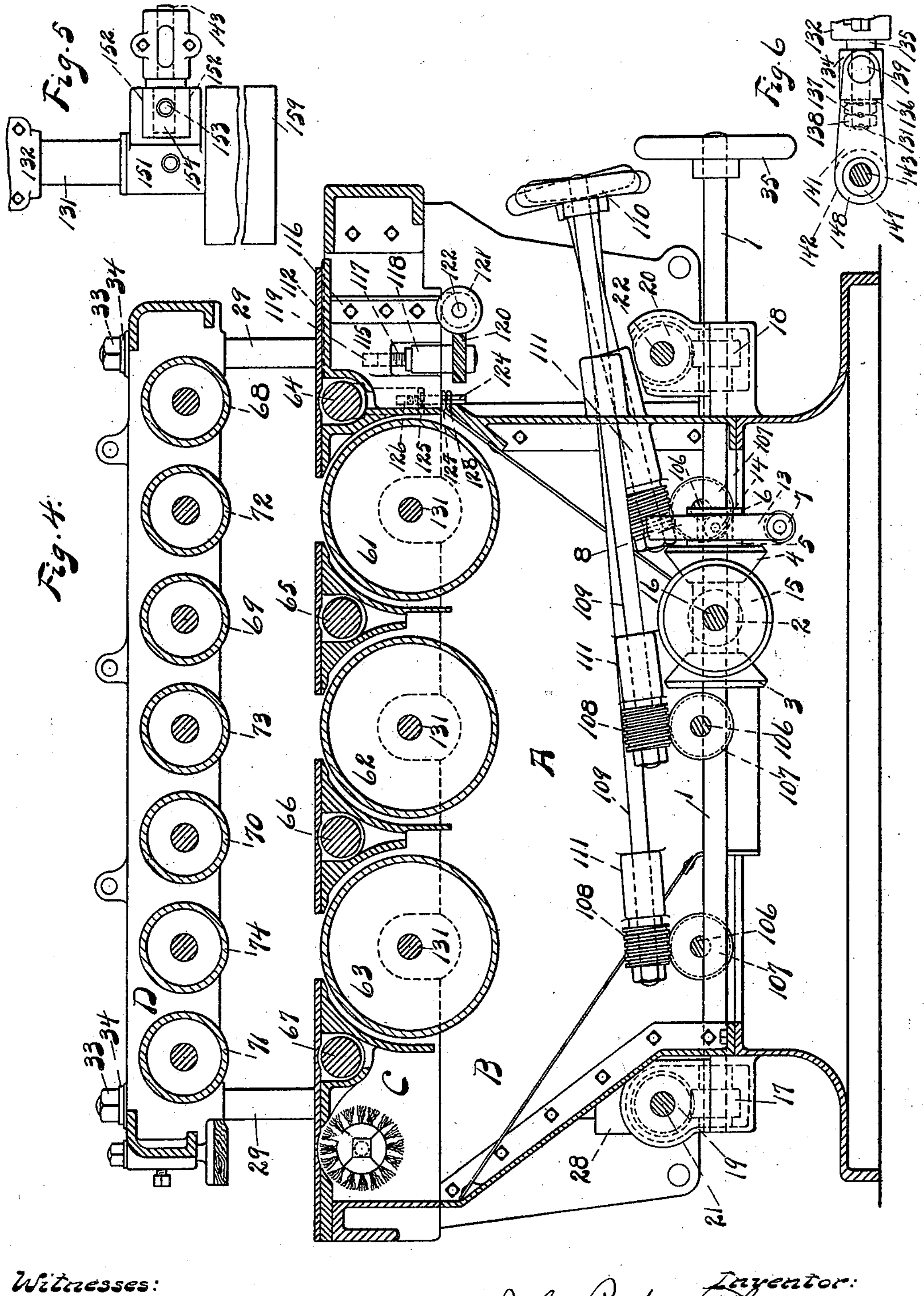
ABRADING MACHINE.

(Application filed May 1, 1899.)

(No Model.) 5 Sheets—Sheet 4.



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No. 645,578. Patented Mar. 20, 1900.

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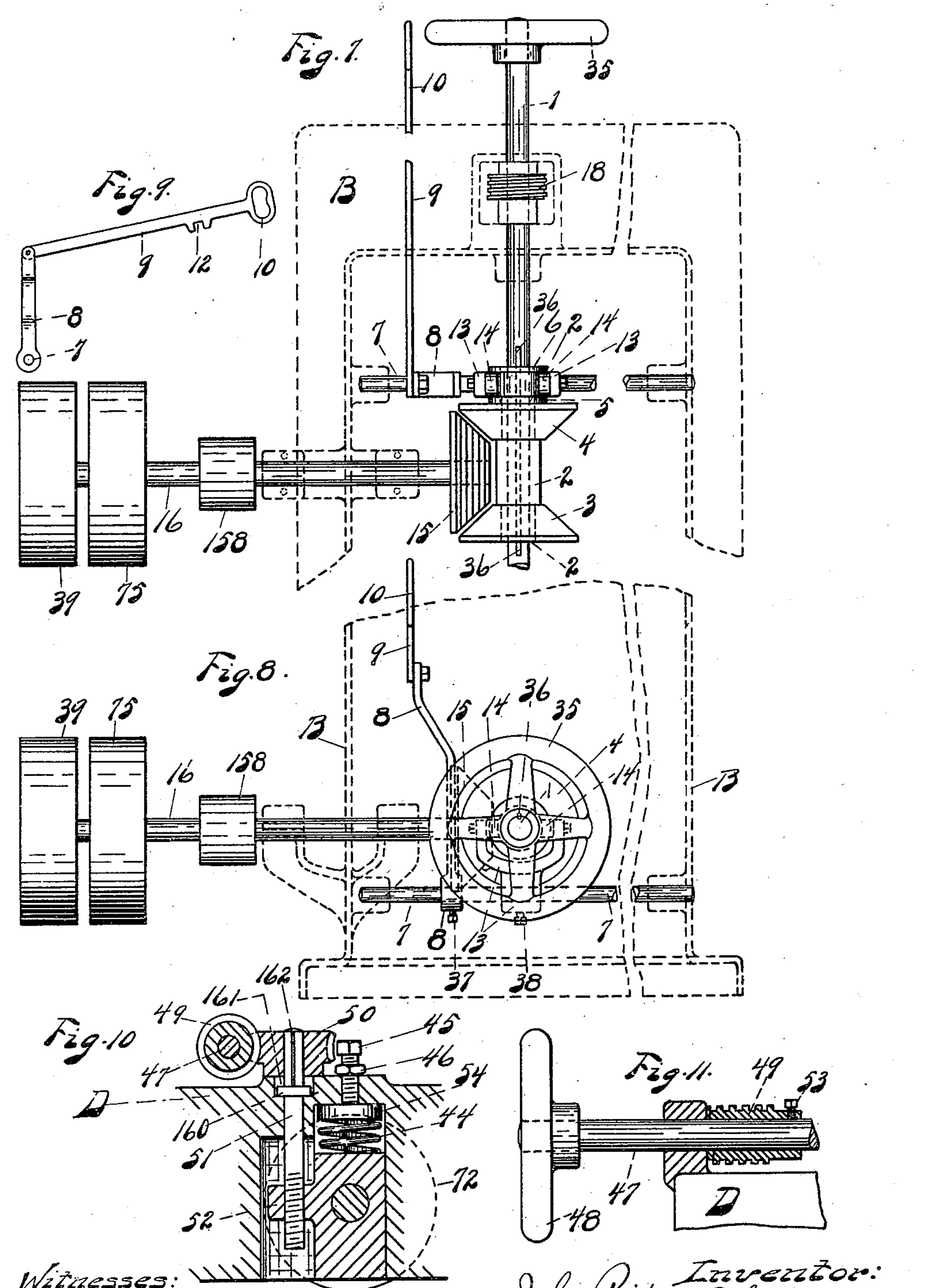
ABRADING MACHINE.

(Application filed May 1, 1899.)

(No Model.) 5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

JOHN RICKARD THOMAS, OF CINCINNATI, OHIO, ASSIGNOR TO THE J. A. FAY & EGAN COMPANY, OF SAME PLACE.

ABRADING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 645,578, dated March 20, 1900.

Application filed May 1, 1899. Serial No. 715,182. (No model.)

To all whom it may concern:

Be it known that I, JOHN RICKARD THOMAS, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a certain new and useful Improvement in Abrading-Machines, of which the following is a specification.

My invention relates particularly to that class of abrading-machines adapted to abrade or polish the surface of wood and other surfaces.

My invention consists in providing a machine of the character described divided into a number of horizontal parts, the lower part of which is adapted to carry the abrading or polishing cylinders, the middle section for carrying the lower feed-rolls, and the upper section carrying the upper feed-rolls, together with the pressure devices for holding the stock to the cylinders, all connected by an adjusting and parting device which throughout a certain part of its movement is arranged to adjust the mechanism contained in the upper section with relation to the mechanism of the middle section and which in the further movement of the adjusting mechanism is adapted to automatically take the middle section with it to expose the abrading-cylinders for manipulation or treatment.

My invention consists, further, in providing a new and improved means for oscillating the abrading or polishing cylinders from an oscillator-shaft whose axis of rotation is in substantially the same plane as the axis of rotation of the cylinders themselves and in providing a means for oscillating the abrading-cylinders whereby the power for oscillation may be applied in substantial line with the axis of rotation of the abrading or polishing cylinders from an oscillating device in substantially the same plane.

My invention consists, further, in so constructing an abrading or polishing machine that the feed-rolls and the pressure-rolls above the polishing-cylinders may be rotated with the same peripheral speed to insure smoothness of work and to allow very thin pieces of stock, such as veneers and light material, to be passed through the machine and give a high finish without danger of injury to or breakage of the stock, an operation heretofore not successfully accomplished.

My invention consists, further, in providing a machine of the character described with a supplemental table and adjustments therefor, whereby, preferably, the first cylinder of the series in the machine may take greater or less abrasion off the stock, according to the adjustment of the table; and my invention consists, further, in the parts and in the construction, arrangement, and combinations of parts hereinafter more fully described and claimed.

In the drawings, Figure 1 is a side elevation of my improved device; Fig. 2 a plan view, and Fig. 3 an end elevation, of the same. Fig. 4 is a longitudinal section taken on the line $x\,x$ of Fig. 3. Fig. 5 is a detail showing an alternative form for connecting the oscillating with the cylinder shaft. Fig. 6 is a side elevation of the oscillator. Fig. 7 is a plan view showing the friction-gear arrangement for operating the screw-shafts separating the frame-sections, indicating the frame in dotted lines; and Fig. 8 is an end elevation of the same. Fig. 9 is a side elevation of the lever for sliding the friction-gear sleeve, and Figs. 10 and 11 are details in section, showing the adjustment for the pressure-roll bearings.

A represents the frame of the machine, divided, preferably, on horizontal lines into three sections B C D, corresponding, respectively, to the lower, middle, and top sections of the frame. Preferably the lower section has mounted therein a shaft 1, (see Figs. 1, 3, 4, 7, and 8,) having a sleeve 2 splined thereon, the latter carrying friction-gears 3 4 and collars 5 6. The sleeve 2, with the friction-gears 3 and 4 thereon, rotates with the shaft 1, but has slidable connection therewith by means of a spline 36, located between the sleeve and shaft. A rock-shaft 7 is also journaled in the lower section of the frame, having an arm 8 secured thereto by a bolt 37 and extending therefrom and connecting with a lever 9, which may carry a grip 10 and be set on a stop 11 on the frame in a notch 12 on the lever to normally hold the frictions out of contact with a live friction-gear hereinafter described. The rock-shaft 7 also carries an arm 13, secured thereto by a bolt 38. The arm 13 is formed fork-shaped at its upper end and is provided with antifriction-rollers 14 14, taking between the collars 5 and 6 and adapted to throw the frictions 3 and 4 into contact with a live friction-gear 15 on a shaft 16, mounted in the lower part of the frame and receiving motion from any suitable source, as by means of a pulley 39. Both the arm 8, connecting with the lever 9 and grip 10, and the arm 13 are mounted on the shaft 7, which extends transversely of the shaft 1. The arm 8 connects with the shaft 7 at a point close to the shaft 1 and then curves outwardly toward the frame, crossing the section-line x x, Fig. 3, and is therefore shown broken in Fig 4. Either friction-gear may be thrown into contact with the live friction-gear or both thrown out of contact, according to the throw of the lever 9. The shaft 1 may also be turned by a hand-wheel 35 thereon. The shaft 1 carries worm-wheels 17 18, adapted to mesh with worms 19 20 on shafts 21 22, mounted in the base of the frame. The shafts 21 22 carry bevel-gears 23 24, meshing with bevel-gears 25 26, journaled in bearings 27 28 in the base of the frame. The bevel-gears 25 26 I prefer to internally thread to receive the screw shanks or shafts 29, which latter are provided with contact connections for making contact with the middle section between the screw-shafts and the middle section, which contact connection I have shown in the form of abutments or collars 30. These screw-shafts are preferably threaded from at or near the collars to the end where they take through the threaded gears. At or near their other end they may be secured, preferably rigidly, to the upper section of the frame—as, for instance, by being provided with a reduced shank 31, taking through apertures in the upper section and secured between shoulders 32 and nuts 33 and washers 34. Above the collars 30, preferably to their meeting point with the upper section, the screw-shafts 29 are provided with flush sides adapted to slide in apertures in the middle section of the frame. These apertures I prefer to make in the shape of bearings, so that the shaft may have a close fit therein. I prefer to make the shafts non-rotatable, giving the rotation to the gears 25 26. The screw-shafts afford a speedy, delicate, and positive adjustment for the upper section of the frame carrying the upper line of feed-rolls and pressure devices above the polishing-cylinders, adjusting them simultaneously with relation to the lower feeding-rolls and abrading-cylinders. This adjustment is allowed from the minimum to the greatest thickness of stock that it may be desired to work. If it be desired to expose the abrading-cylinders or mechanism contained in the lower part of the frame for the purpose of examination of the abrading-cylinders, their removal, the renewal of the abrading material thereon, or for other purposes, the raising of the screw-shaft is continued, when the collars 30 will simultaneously abut against the middle section of the frame and automatically carry it with them in their further movement. The screw-shafts are merely operated in the direction of their movement to separate the sections of the frame without retrograde movement of the screws between the completion of the adjustment of the upper and middle frames for thickness of stock and the raising of the middle section for exposing the cylinders. The screw-shafts thus automatically serve as a means for the simultaneous adjustment of the feeding and pressure devices throughout a certain part of their movement and automatically serve as a raising and lowering device for the middle section and the exposing of the polishing-cylinders throughout another part of their movement.

Independent adjustment may be given the upper line of feed-rolls, as by means of set-nuts 41 and jam-nuts 42, taking about shanks 43, connecting with the roller-bearings. Springs 44, adjusted by means of set-bolts 45 and jam-nuts 46, may yieldingly hold the rolls up to their work. Transverse shafts 47, having hand-wheels 48, are provided with worms 49, meshing with worm-wheels 50, slidably secured to screw-shafts 51, screwing into lugs 52 on bearings for the pressure-rolls above the cylinders. (See Fig. 10.) The screw-shaft 51 is provided with a collar 160, normally seated at the bottom of a recess 161 in the upper frame-section. The worms 49 may be releasably secured to the shafts for giving independent or simultaneous adjustment to the ends of the pressure-rolls, as by means of a bolt 53, passing through an extended hub on the worm 49, as shown in Fig. 11. The bolt on either worm of a given shaft may secure the worm rigidly to the shaft or be slightly unscrewed to allow the worm to slip rotatably on the shaft. The pressure-roll bearings may also have springs 44 for yieldingly holding them in normal position, set-bolts 45, having jam-nuts 46, being provided for adjusting the tension of the springs. A washer 54 is interposed between the spring and set-bolt. The yield of the pressure-roll is slight. When it yields, it slightly raises the screw-shaft 51 within the worm-wheel 50. The latter is splined to the screw-shaft by a spline 162. The lower feed-rolls are mounted on slides 55, resting on bolts 56, taking through lugs 57 in the frame of the machine and having jam-nuts 58. The slide may be secured by bolts 59 taking into the middle section of the frame through slots 60 in the slides.

I have preferred to show my device as embracing a series of three abrading or polishing cylinders, (designated as 61, 62, and 63,) each of which may be provided with a suitable pulley preferably located to one side of the machine; but one or more of the pulleys may be located at the other side of the machine, as hereinafter explained. The device, as shown, also embraces eight feeding-rolls—

four in the bed, as at 64, 65, 66, and 67, representing the lower rolls, and four above the bed, as at 68, 69, 70, and 71, representing the upper rolls. The pressure-rolls I have designated by the numerals 72, 73, and 74. The lower line of feed-rolls 64, 65, 66, and 67 are preferably carried by the middle and the upper line of feed-rolls and the pressure-rolls by the top section of the frame. It is obvious that a greater or a less number of feeding-rolls or abrading or polishing cylinders may be employed. I have so mounted and geared the feeding-rolls and the pressure-rolls above the cylinders as to cause them to rotate with the same peripheral speed and causing the pressure-rolls to also perform the function of feed-rolls, giving to the machine great ease of operation, producing smoother work and a higher polish, and allowing very thin and curly stock to be polished, such as veneers and other thin stock.

In attempting to polish stock of the latter class in constructions heretofore employed it has been found that the stock will buckle and break. I have therefore devised my improved machine, in which this class of work is accomplished to great perfection. The action is such as to cause the stock to be advanced by a series of propelling agencies, which in my construction include the pressure-rolls, advancing at a uniform speed. Power for the feeding agencies is derived from a pulley 75 on the shaft 16, which transmits motion to a pulley 76 on a shaft 77, also carrying a pulley 78, from which motion is transmitted to a pulley 79 on a shaft 80. The shaft 80 carries a pinion 81, which meshes with a gear 82 on a shaft 83, which also carries a pinion 84 at its opposite end, meshing with a gear 85 on a stud 86, which latter carries a pinion 87 and meshes with a gear 88 on a stud 90. The gear 88 meshes with a gear 91 on the lower infeeding-roll. The lower infeeding-roll also carries a gear 92 at its opposite end. Each of the lower rolls is adapted to carry a gear 92, the series being connected by idler-pinions 93. Each of the upper feed-rolls and the pressure-rolls is provided with gears 94, connected by idler-pinions 95. The gear 88 may also mesh with a gear 97, mounted in an expansion device 98. The gear 97 in turn meshes with a gear 99 on the shaft of the first infeeding upper roll. In the construction shown I have shown the lower feed-rolls as of relatively-smaller diameter than the upper feed-rolls, so as to bring the abrading or polishing cylinders together more closely, but have compensated for the difference in diameter of the rolls by the relative different diameters of the driving-gear 91 for the lower train of feed-rolls and the connecting-gears 97 and 98 for the upper line of feed-rolls and the pressure-rolls, giving to the latter a relatively-slower rotation owing to their larger diameter, but giving the upper and the lower line of feed-rolls, as well as the pressure-rolls, the same peripheral speed.

The abrading or polishing cylinders are preferably mounted in the base of the frame on slides 102, (see Fig. 1,) adjustable in ways 103 by means of screw-shafts 104, mounted in bearings in the lower section and connected with shafts 106. (See Fig. 4.) The shaft 106 has worm-wheels 107, with which worms 108 on shafts 109 mesh. The shafts 109 have hand-wheels 110 and turn in bearings 111.

At the infeeding end of the machine in advance of the first polishing-cylinder I prefer to make the table vertically adjustable in parallel lines, forming a supplemental infeeding-table 112 with an infeeding-roll adjustably journaled therein. (See Fig. 4.) This table extends transversely of the machine, and at or near each end is adjustable on slides 115 in ways 116, preferably on the inside of the middle section of the frame. A screw-shaft 117 is stationarily journaled in a lug 118 on the frame and takes into a threaded aperture 119 on the slide. The screw-shaft has a gear 120 thereon, which meshes with a similar gear 121 on a transverse shaft 122, journaled in the middle section of the frame and operated by a hand-wheel 123. (See Fig. 3.) The infeeding-roll is mounted in the supplemental table. It receives a vertical adjustment through an adjusting-screw 124 with a collar 125, resting on the frame of the table and screw-threaded into an aperture 126 in the bearing of the roll and held in place by means of set and jam nuts 127 128. (See Fig. 4.)

The abrading or polishing cylinders 61, 62, and 63 are mounted on shafts 131 in bearings 132. The shafts also carry bearings 134, adapted to take between collars 135 136. (See Fig. 2.) The collar 135 is preferably rigidly secured to the shaft. Set and jam nuts 137 138 take over the end of the shaft for giving the necessary adjustment between the collars for the bearing and to take up wear. The bearings 134 may also have studs 139 thereon, preferably in the horizontal plane of the axis of rotation of the cylinder-shaft. (See Fig. 6.) Arms 141 of an oscillator-yoke 142 are pivoted to the studs and extend in substantial axial line with the cylinder. An oscillator-shaft 143 is journaled in bearings 144 in the base-section of the frame, and it has its axis of rotation in substantially the horizontal plane of the axis of rotation of the polishing-cylinders. It receives its rotation from a shaft 155, (see Figs. 1, 2, and 3,) journaled in bearings 156, carrying a pulley 157, connecting with a pulley 158 on the shaft 16. The shaft 143 and the shaft 155 are connected by gears 145 146. The oscillator-shaft carries journals 147 for bearings 148 in the oscillator-yokes, which journals are slightly eccentric to the shaft and impart a vibration or oscillating movement to the cylinders, the latter preferably having smooth journals 132 to allow their oscillation. The line of thrust and pull on the cylinder-shafts is in substantial line with the axis of rotation of the shafts and imparts to the shafts a direct force in that line against a series of rotating parts, relieving the bearings in which the cylinders are mounted of all side strain or thrust and insuring a positive, easily-operating, substantial, direct-acting device and movement for the vibration or oscillation of the abrading or polishing cylinders, relieved of pressure that would tend to bind the cylinders in their bearings or relation to their work. In practice the pulleys for operating the polishing-cylinders are usually attached to their shafts on the end opposite to the oscillator-bearings and receive their motion from pulleys on a detached counter-shaft suitably located. It is sometimes desired, however, to have one of the pulleys on the same side to which the oscillator-bearing is attached. I then prefer to employ the oscillator-bearing 151, suitably adjustably located on the shaft and held against endwise movement thereon. The bearing has ways 152 to accommodate a slide 153, receiving a journal 154, eccentrically mounted at the end of the oscillator-shaft 143 and imparting oscillating or vibrating movement to the cylinder-shaft from the oscillator-shaft rotating in the same horizontal plane and allowing a pulley, as at 159, to be used on the same side as the oscillator.

It is obvious that changes may be made in the construction of my device without departing from the spirit of my invention.

I claim—

1. In an abrading-machine, a main frame comprising a plurality of sections, a top section carrying the upper line of feed-rolls, a middle section carrying the lower line of feed-rolls, and a lower section carrying the abrading cylinder or cylinders, in combination with a plurality of screws geared together and connecting the lower with the top section, and operating simultaneously for first adjusting the top section for different thicknesses of stock to be worked, and, second, with a contact connection on each screw between the screw and the middle section for making contact connection with the middle section for raising the middle section to expose the cylinder or cylinders without intermediate retrograde movement of the screws between the completion of the adjustment for thickness of stock, and the raising of the middle section, substantially as described.

2. In an abrading-machine, a three-part abrading-machine frame, the lower part carrying the bearings for the abrading cylinder or cylinders, the middle carrying the table and the lower line of feed-rolls, and the top carrying the upper line of feed-rolls, in combination with a series of adjusting-screws connecting the lower with the top section, and geared to one of the frame parts, and movable longitudinally with relation to another frame part for part of their length, and a contact connection on each of the screws between the screw and the latter part for making contact connection therewith and carrying the middle frame part with them in their further movement, constructed and arranged for first adjusting the top frame part with relation to the middle frame part for feeding different thicknesses of stock, and, second, for raising the middle frame part with the top frame part by the contact connection on each screw making contact connection with that other frame part to expose the cylinder or cylinders without intermediate retrograde movement of the screws between the completion of the adjustment for thickness of stock and the raising of the middle section, substantially as described.

3. In an abrading-machine, the combination of a main frame divided into a plurality of sections, an upper section carrying an upper line of feed-rolls, a middle section carrying a lower line of feed-rolls, and a lower section carrying an abrading cylinder or cylinders, a series of adjusting-screws stationarily secured to the upper section, a part of the shanks of same moving past the middle section, leaving the middle section at rest, a threaded gear for each of the screws journaled in the lower section, screw-threads on the screws throughout another part of their length opposite the lower section, and a contact connection on each of the screws for the middle section between each screw and the middle section for making vertical contact connection with the latter and raising the same with the screws simultaneously moving longitudinally with relation to the lower section, substantially as described.

4. In an abrading-machine, the combination of a series of abrading-cylinders, a series of feed-rolls, and a series of power-driven pressure-rolls above the abrading-cylinders, with gearing or similar means for positively driving the feed-rolls and the pressure-rolls simultaneously at the same peripheral speed and in the same direction at their contact-point with the stock, substantially as described.

5. In an abrading-machine, comprising one or more abrading-cylinders, the combination of geared feed-rolls for each side of each abrading-cylinder positively revolving at a uniform peripheral speed, with a geared pressure-roll above each abrading-cylinder positively and simultaneously revolving at the same peripheral speed and in the same direction at their contact-point with the stock, substantially as described.

6. In an abrading-machine, the combination of a series of abrading-cylinders, a lower feed-roll and an upper feed-roll operating between each two adjacent abrading-cylinders, and a lower feed-roll and an upper feed-roll operating at each end of the series of abrading-cylinders, a pressure-roll above each abrading-cylinder, a shaft for each roll, gearing for operating the lower feed-rolls, with a gear attached to the shaft of each upper feed-roll, and a gear attached to the shaft of each pressure-roll, and an idler-gear between each

two adjacent gears on the upper feed-roll and pressure-roll shafts and meshing therewith, constructed and arranged for positively driving the feed-rolls and the pressure-rolls simultaneously at the same peripheral speed and in the same direction at their contact-point with the stock, substantially as described.

7. In an abrading-machine, the combination of one or more abrading-cylinders, a table, feeding-rolls adjustable with relation to the table, a secondary table at the feeding-in end of the machine, and adjusting-screws or similar means for vertically adjusting the secondary table with relation to the infeeding-cylinder in parallel vertical lines, substantially as described.

8. In an abrading-machine, the combination of one or more abrading-cylinders, a table, a feeding roll or rolls adjustable with relation to the table, an infeeding-table, a screw-shaft or similar means for vertically adjusting the latter with relation to the infeeding-cylinder, an infeeding-roll mounted in the infeeding-table, and vertical adjustment in the infeeding-table for the latter roll, substantially as described.

9. In an abrading-machine, one or more abrading-cylinders, in combination with feed-rolls to each side of each cylinder, and a pressure-roll above each cylinder, with gearing for driving the feed-rolls and the pressure roll or rolls at the same peripheral speed, a table through which the abrading cylinder or cylinders may project for abrading the stock passing over the table, and an infeeding-table vertically adjustable with relation to the former table, substantially as described.

10. In an abrading-machine, one or more abrading-cylinders, in combination with feed-rolls to each side of each cylinder, and a pressure-roll above each cylinder, with gearing for driving the feed-rolls and the pressure roll or rolls at the same peripheral speed, a table through which the abrading cylinder or cylinders may project for abrading the stock passing over the table, an infeeding-table vertically adjustable with relation to the former table, an infeeding-roll mounted in and adjustable with the infeeding-table, and independent vertical adjustment for the roll, with relation to the latter table, substantially as described.

11. In an abrading-machine, the combination of one or more abrading-cylinders, a shaft for each, an oscillator-shaft located beyond the end of the abrading-cylinder shaft or shafts, the axes of the several shafts being in substantially the same plane, an additional abrading-cylinder, a shaft therefor extending beyond the end of the oscillator-shaft and having its axis in substantially the same plane, an eccentric on the oscillator-shaft for each abrading-cylinder shaft, and a connection with the latter, substantially as described.

12. In an abrading-machine, the combination of a plurality of abrading-cylinders with their shafts, and an oscillator-shaft for the latter rotatably mounted at right angles thereto beyond their ends in the same plane, with an additional abrading-cylinder, a shaft therefor extending beyond the end of the oscillator-shaft at right angles thereto and in the same plane, the oscillator-bearing 151 thereon, the ways 152 in the bearing, the slide 153, and the journal 154 received thereby and eccentrically mounted at the end of the oscillator-shaft, constructed and arranged substantially as and for the purpose specified.

13. In an abrading-machine, the combination of one or more abrading-cylinders, with driven feed-rolls and a driven pressure-roll for each cylinder, means for positively rotating the driven feed-rolls and the driven pressure roll or rolls at the same peripheral speed, an oscillator-shaft extending at substantially right angles to the axis of the abrading cylinder or cylinders and rotating in substantially the plane of the axial line thereof, and an oscillator device for the cylinder or cylinders extending in substantially the axial line of the latter, substantially as described.

14. In an abrading-machine, the combination of one or more abrading-cylinders, with driven feed-rolls and a driven pressure-roll for each cylinder, means for rotating the rolls at the same peripheral speed, an adjustable infeeding-table, and an oscillator device for each of the cylinders extending in substantially the axial line thereof, substantially as described.

15. In an abrading-machine, the combination of one or more abrading-cylinders, with driven feed-rolls and a driven pressure-roll for each cylinder, means for rotating the rolls at the same peripheral speed, an adjustable infeeding-table, an infeeding-roll adjustable therewith and independently thereof, and an oscillator device for each of the cylinders extending in substantially the axial line thereof, substantially as described.

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