

No. 637,121.

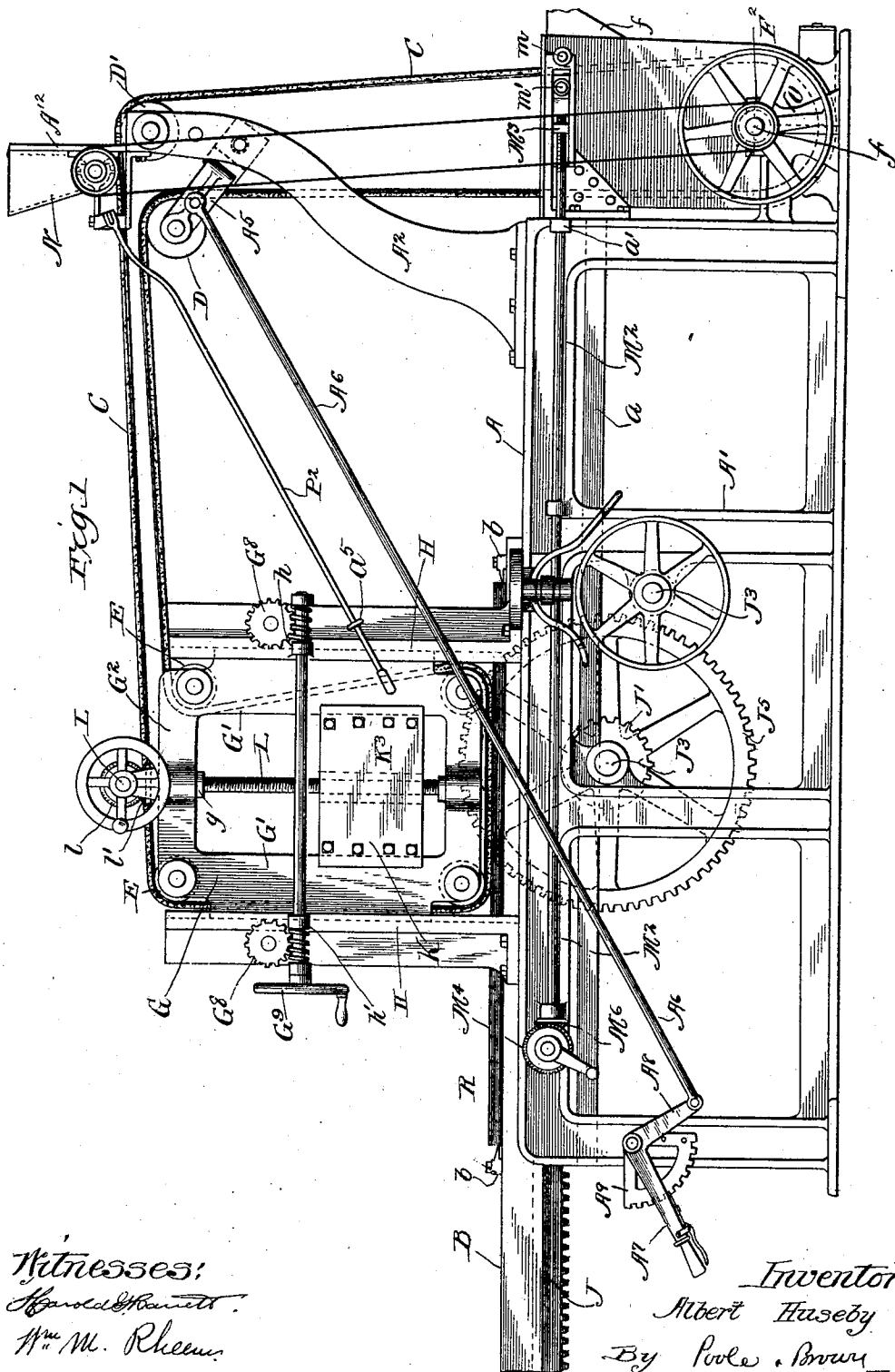
Patented Nov. 14, 1899.

A. HUSEBY.
POLISHING MACHINE.

(No Model.)

(Application filed Apr. 3, 1899.)

4 Sheets—Sheet 1.



Witnesses:
Harold Bennett.
H. M. Rheuer.

Inventor:
Albert Huseby
By Poole & Brown
Attys

No. 637,121.

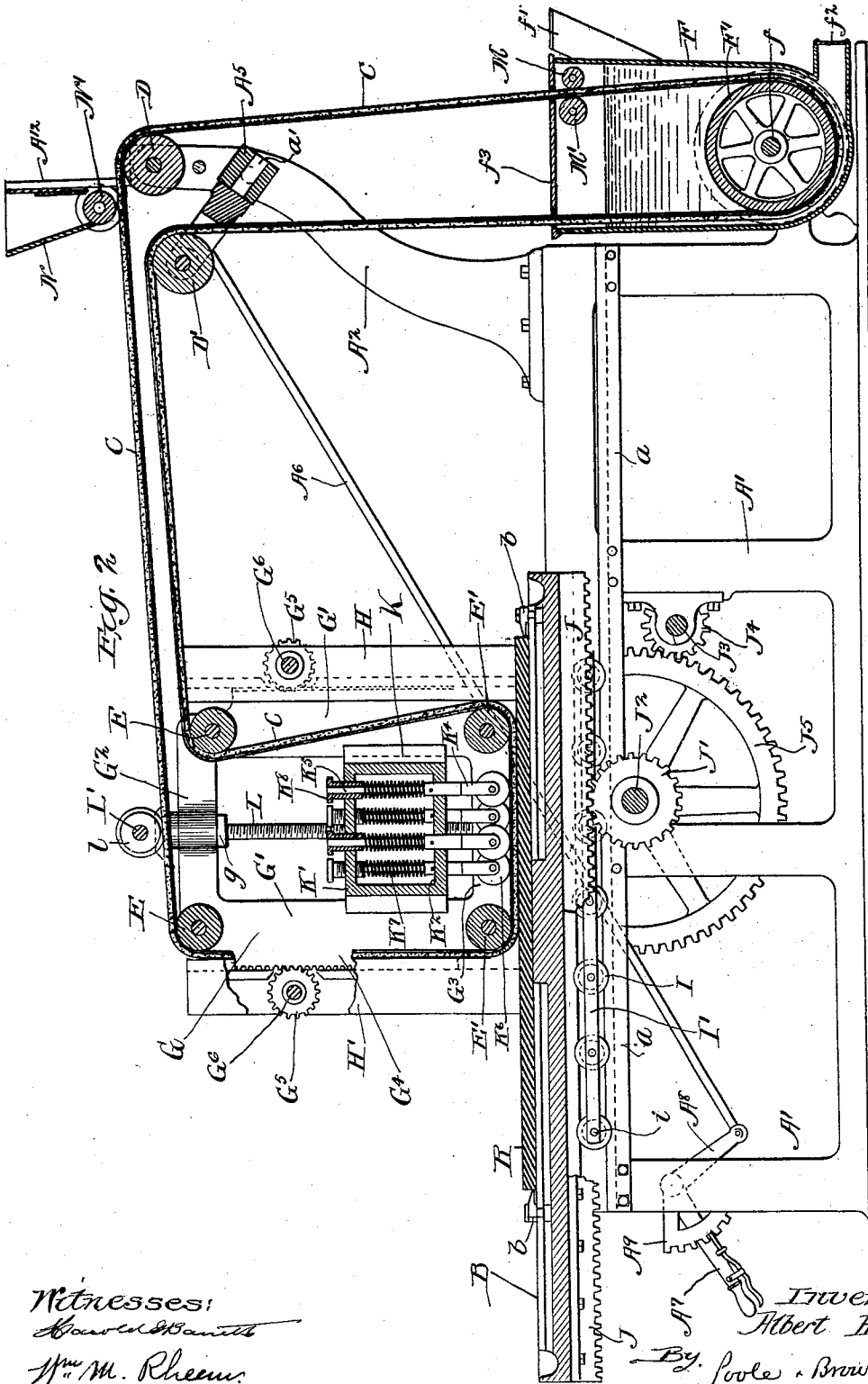
Patented Nov. 14, 1899.

A. HUSEBY.
POLISHING MACHINE.

(Application filed Apr. 3, 1899.)

(No Model.)

4 Sheets—Sheet 2.



Witnesses:

Harold Banitt

Wm. M. Rheum

Inventor:
Albert Huseby.

By *Pooler & Brown Attys*

No. 637,121.

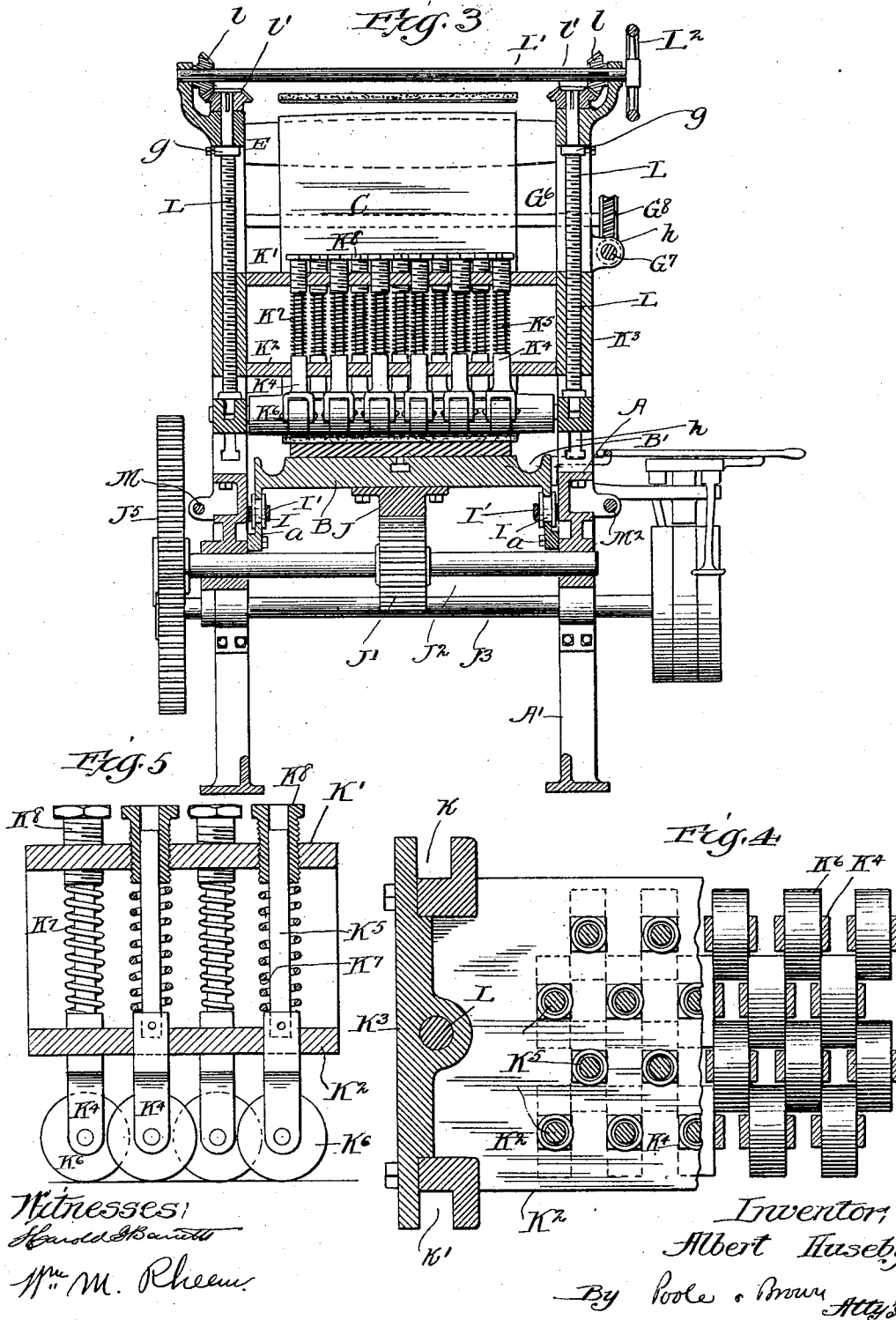
Patented Nov. 14, 1899.

A. HUSEBY.
POLISHING MACHINE.

(Application filed Apr. 3, 1899.)

(No Model.)

4 Sheets—Sheet 3.



No. 637,121.

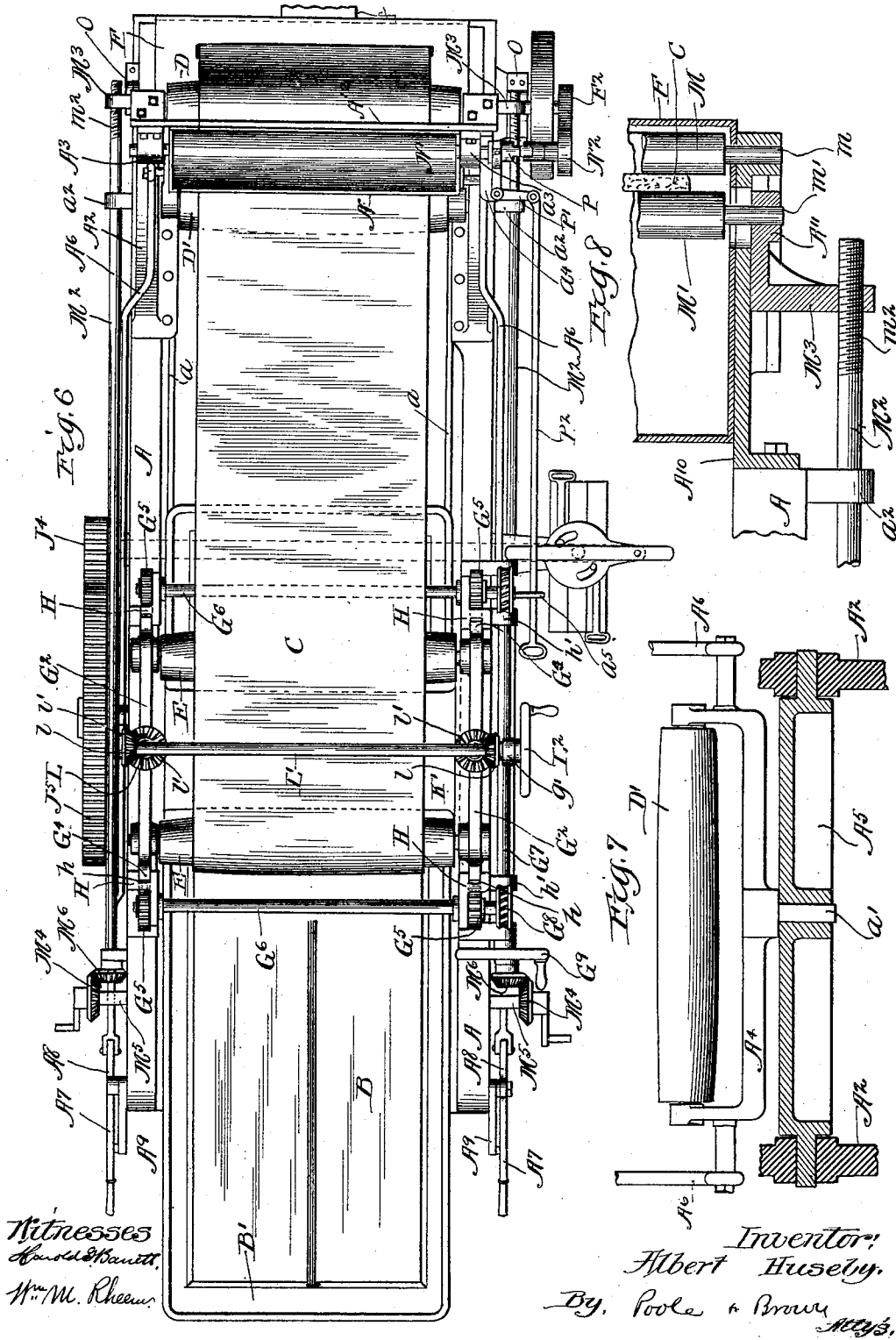
Patented Nov. 14, 1899.

A. HUSEBY.
POLISHING MACHINE.

Application filed Apr. 3, 1899.

(No Model.)

4 Sheets—Sheet 4.



UNITED STATES PATENT OFFICE.

ALBERT HUSEBY, OF CHICAGO, ILLINOIS.

POLISHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 637,121, dated November 14, 1899.

Application filed April 3, 1899. Serial No. 711,532. (No model.)

To all whom it may concern:

Be it known that I, ALBERT HUSEBY, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Polishing-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to an improved machine for rubbing and polishing smooth surfaces—such as those of pianos, furniture, or parts thereof before the same have been put together—woodwork for house-finishing, granite, marble, and the like; and the invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In the drawings illustrating one embodiment of my invention, Figure 1 is a side elevation of a machine embodying my invention. Fig. 2 is a vertical longitudinal section thereof. Fig. 3 is a transverse vertical section. Fig. 4 is an enlarged view, partly in section and partly in plan, of the pressure device. Fig. 5 is a vertical section of the same. Fig. 6 is a plan view of the machine. Fig. 7 is a detached detail view of one of the belt-supporting pulleys. Fig. 8 is a fragmentary detail showing the pressing or squeezing rollers which engage the belt above the bath-tank.

A machine embodying my invention embraces a suitable bed adapted to support the material to be operated upon; an endless polishing-belt, a portion of which travels in a path parallel with the bed; a receptacle adapted to contain an abrasive substance, preferably held in suspension and through which said belt passes, a portion of the abrasive substance clinging to the belt and being carried thereby to the article to be polished, and a suitable pressure device or presser for holding the belt in contact with the article which is to be polished.

As shown in said drawings, A A designate two parallel horizontal rails or bars supported on the upper ends of vertical standards or legs A', which rails constitute a bed or support for a horizontally-movable carriage B, upon which the articles to be polished are supported. Said bed and carriage will be

made of any suitable form to accommodate the different classes of articles to be operated upon. As herein shown, these parts are similar to corresponding parts of an ordinary planing-machine. Said bed-rails are provided on their inner sides with guide-rails *a a*, upon which the carriage is supported. Said carriage in the present instance rests directly upon traveling rollers I, which rest and roll upon said rails *a* and are journaled upon suitable bearing-pins *i*, which extend transversely between and are secured to parallel bars I', between which said rollers are confined. The carriage is adapted to move longitudinally of the bed and is actuated through the medium of a rack-bar J, connected with the lower side thereof, and a rotative pinion J', engaging said rack-bar. Said pinion is attached to a rotative shaft J², journaled in the bed-rails A, and said shaft is driven from a main driving-shaft J³, through the medium of the pinion J⁴ thereon, which meshes with the gear-wheel J⁵ on said shaft J². Said main driving-shaft J³ is provided with a suitable belt-pulley through which the shaft is driven from any suitable source of power, said pulley being constructed to form part of an automatic carriage reversing or arresting device, which is of common form and need not be further explained.

C designates an endless traveling belt, which is trained about pulleys DD', EE, and E'E', mounted above said bed transversely of the machine. Said belt is made of a suitable fibrous material, such as felt, and, if necessary, will be provided on its inner side with a layer of strengthening material—such as canvas, rubber, or the like—to give durability thereto.

F designates a tank, which is located at the rear of the machine and in the present construction preferably at the level of the surface of the floor which supports the machine and is adapted to contain an abrasive bath, such as one of water, in which powdered pumice-stone or the like is held in suspension and through which the belt C passes. Said tank is made of a width equal to or greater than that of the belt and is provided with a rotative drum F', about which the belt C is trained, said drum being located at the bottom of the tank and connected with a

shaft *f*, which is journaled in suitable pillow-blocks O O, supported on the floor on each side of the tank. Said drum is rotated and the belt thereby caused to travel through the medium of a pulley F³, attached to the shaft *f* and located outside of the tank and driven from any suitable source of power. Said pulleys and drum are crowned to prevent the belt from slipping off of the same.

The pulleys D D' are mounted upon or near the upper ends of two laterally-separated standards A², which rise upwardly from the bed-rail A at the rear end of the machine. The pulley D' is adjustably connected with the standards, whereby the same may perform the function of a belt-tightener, and is also mounted so as to be capable of being tilted to throw it out of parallel with the other pulleys, and thereby tighten either edge of the belt more than the other in order to correct any inaccuracies in the movement of the belt due to unequal shrinkage of the latter. The pulleys E E are mounted in the upper part of a vertically-movable belt-carrying frame G, which is supported between upright guides H, which rise from the bed-rails near the front end of the machine, and the pulleys E' are mounted transversely in the lower end of said belt-frame and parallel with the top surface of the carriage B. The portion of the belt between said pulleys E' E' is therefore sustained parallel with the top surface of the carriage and constitutes the part which acts upon the surface to be polished.

The guides H are four in number, two being located on each side of the machine. The belt-carrying frame consists of four vertical members G', located one in contact with each of the guides H and parallel therewith, and horizontal end and side members G² G³, united rigidly with said vertical members. Said frame is made vertically movable, whereby the horizontal part of the belt between the rollers E' E', carried by said frame, may be moved toward and from the carriage to accommodate articles of varying thickness. As a convenient means for raising and lowering said frame devices are provided as follows: The vertical members G' of said frame are provided in their sides adjacent to the guides H with vertically-arranged rack-bars G⁴, which are located within and have sliding engagement with vertical grooves *h* in the faces of said guides adjacent to said frame members, as shown in Fig. 6. Each of said guides is provided with a gear-pinion G⁵, which pinions engage said rack-bars, said pinions projecting through openings in the guides, (as shown in Fig. 2,) which intersect said grooves *h* therein. The gear-pinions G⁵ at both the front and rear sides of the frame are non-rotatively connected with a rotative shaft G⁶, which shafts are journaled in outwardly-directed flanges on said guides. Said shafts G⁶ are preferably connected by a worm-gear connection whereby they may be rotated simultaneously. Said connections, as herein

shown, consist of a horizontally-arranged rotative screw-threaded shaft G⁷, which is mounted in bearings *h'* on the outer faces of the guides H at one side of the machine, and worm-wheels G⁸, attached to the said shafts G⁶, which engage the screw-threads of said shaft G⁷. Said shaft is provided with a hand-wheel G⁹, by which it may be rotated and through the means described acts to move the frame G with respect to the guides, and thereby vary the distance between the active portion of the polishing-belt and carriage.

A suitable pressure device or presser is provided, which is adapted to engage the horizontal portion of the belt between the rollers E' E' on the side thereof opposite that which engages the article to be polished and to hold the belt in close contact with the surface of said article. As a further and separate improvement I have provided a presser consisting of a plurality of independently-movable presser elements having relatively small contact-surfaces, whereby a practically uniform pressure is exerted upon the surface of the article which is being polished, notwithstanding irregularities which may be present in such surface. This feature of my invention is made as follows:

K designates as a whole a presser-frame located inside of the frame G and connected with said frame by means permitting of vertical adjustment with respect thereto. Said presser-frame consists of two horizontal parallel plates K' K², connected at their ends by vertical plates K³. Said end plates are provided on each side thereof with vertical grooves *k*, which are engaged at the inner edges by the vertical members G' of the frame G, which latter constitutes vertical guides for the presser-frame. Said horizontal plates K' K² of said frame are provided with a plurality of oppositely-arranged openings which constitute guide-apertures for a plurality of vertically-arranged stems K⁵, which latter project at their upper and lower ends beyond said plates and carry at their lower ends presser elements consisting of rollers K⁶, adapted to engage the belt C. Said stems have independent vertical movement with respect to the presser-frame and preferably have spring-pressed engagement with said frame, thereby permitting each of said presser-rollers to accommodate itself to inequalities in the surface of the article which is being polished. As herein shown, the lower ends of said stems are made detachable and consist of fork-arms K⁴, between which the rollers are journaled. The shanks of said fork-arms are made hollow, and the stems are secured thereto by being inserted in said hollow portions of the shanks and held therein by transverse pins, as shown. In the present instance said stems K⁵ are surrounded by spiral springs K⁷, which are interposed between the upper ends of the shanks of the forks K⁴ and shoulders on the upper plate K' of said presser-frame and act expansively to

normally move the stems and rollers carried thereby downwardly against the belt. As herein shown, the said shoulders consist of tubular nuts K^8 , which are exteriorly screw-threaded and have screw-threaded engagement with the apertures in the upper plate K' of the pressure-frame and with the bores of which the stems have sliding engagement. With this construction the tension of the springs may be varied by turning the nuts inward or outward, as desired. Said presser-frame is connected with the frame G , so as to be vertically movable therewith, and said connections are also constructed to give independent vertical movement to the presser-frame, so that the pressure on the belt C exerted by the several presser elements as a whole may be varied. This is accomplished in the present instance as follows:

L designates two vertically-arranged screw-threaded shafts which are rotatively connected with the end members G^2 of the frame G and are longitudinally immovable with respect thereto. As herein shown, said shafts rotatively engage both the upper and lower end members and are held from vertical movement by means of collars g , connected with the shaft by set-screws, as shown, and engaging the inner surface of said end members. Said shafts pass through and have screw-threaded engagement with vertical apertures in the end plates K^8 of the presser-frame. With this construction when the shafts L are rotated the presser-frame carried thereby is vertically moved with respect to the frame G . Said shafts L are shown as connected, so as to be simultaneously rotated through the medium of a horizontally-rotative shaft L' , mounted in bearings g' , which project upwardly from the end members G^2 of the frame and are provided near their ends with beveled gear-pinions l , which engage other beveled gear-pinions l' on the upper ends of the shafts L . Said connecting-shaft is adapted for rotation by a hand-wheel L^2 .

In order that the presser-rollers may exert a uniform pressure on the belt notwithstanding any irregularities which may be present in the surface of the article which is being polished, said rollers are made of relatively short length and diameter, thereby reducing to a minimum the area of contact of each of the rollers with the belt. Said rollers are arranged in sets or rows which extend transversely of the machine, four of such sets being herein shown. As a further improvement the rollers of each set are spaced at a distance apart equal to or slightly greater than the length of said rollers, and the rollers of one set have overlapped relation to the rollers of the adjacent set, as clearly shown in Figs. 4 and 5. This construction insures that all parts of the belt will come in contact with the rollers and at the same time provides spaces between the rollers for the bearing-arms of the stems K^5 , between which arms the rollers are journaled. So far as the essential fea-

tures of my invention are concerned, the pressure elements may consist of sliding shoes or springs instead of rollers K^6 , as herein shown.

The pulley D' is mounted on the standards A^2 by means permitting the same to be swung or oscillated vertically, whereby it may be moved to vary the tension of the belt. The construction by which this is accomplished is shown more clearly in Figs. 2 and 7 and is made as follows: Said pulley is journaled between the arms of a yoke A^4 , which latter is connected with a cross-bar A^5 , which extends between and is rotatively mounted at its opposite ends in suitable apertures in the standards A^2 . A^6 A^6 designate endwise-movable rods located on opposite sides of the machine and connected at their upper ends with the opposite ends of the yoke A^4 and at their lower ends with adjusting and locking devices by which said pulley may be properly adjusted and locked rigidly to said frame. Said adjusting and locking devices, as herein shown, consist of levers A^7 A^7 , pivoted to the standards A' of the frame of the machine, on each side thereof, and provided with rigid angular arms A^8 A^8 , connected with the lower ends of said rods. Said levers are provided with suitable spring-pressed pawls operated by thumb-levers, which pawls are adapted to engage notches in segmental racks A^9 , mounted on said machine-frame adjacent to the levers. With this construction the shifting-levers act through the said arms A^8 and the connecting-rods to swing the pulleys D' bodily, and thereby vary the tension of the belt. Said pulley, as before stated, is mounted so as to be capable of being tilted, and thereby correct any irregularities in the travel of the belt upon the pulleys due to unequal shrinkage or inequality in the length of its side margins. This is accomplished by providing the yoke A^4 centrally thereof with a pivot-stud a' , which is adapted to engage a bearing-aperture located in the cross-bar A^5 , near the longitudinal center thereof. This adjustment may be effected by the same levers A^7 which act, as before explained, to swing the pulley vertically.

The tank F is provided at its upper end with a chute f' , through which the abrasive material and the water may be fed thereinto, and is also provided at its end with an outlet-passage f^2 , through which the contents of said tank may be drained therefrom. Preferably said tank will be provided with a cover f^3 , secured thereon in any suitable manner, which cover is provided with suitable slits for the passage of the laps of the belt therethrough. Desirable means will be provided within or upon the tank for compressing the belt after it has passed through the bath within the tank to remove the excess of liquid therefrom and maintain a uniform degree of moisture in the belt as it passes from the tank. Devices for this purpose are made as follows: M M' designate rollers located within the upper end of

the tank, one on each side of the rear lap of the belt C. Said rollers are provided with journal-shafts $m\ m'$, which extend outwardly through the walls of the tank and are rotatively mounted in rearwardly-extending brackets A^{10} on the machine-frame. The rear roller N is mounted in stationary bearings, while the front roller M' is mounted in movable bearing-blocks A^{11} , which have sliding engagement with the brackets A^{10} , whereby said roller M' may be moved toward and from the roller M. Suitable slots are provided in the brackets A^{10} and adjacent parts of the wall of the tank to permit such movement of the shaft m' of said roller. Said movable blocks are actuated through the medium of rotative shafts M^2 , which have bearing in lugs a^2 on the frame. Said shafts are immovable longitudinally thereof with respect to the frame and provided at their rear ends with screw-threaded portions m^2 , which have engagement with screw-threaded apertures in laterally-extended arms M^3 on said sliding bearing-blocks. With this construction rotation of said shafts will act to move said bearing-blocks and connected rollers toward or away from the rollers M as desired. Said shafts are rotated through the medium of beveled gear-pinions M^4 on each side of the machine, attached to rotative shafts M^5 , which gear-pinions mesh with other gear-pinions M^6 on the forward end of said shafts M^2 .

It may be desirable in some instances to supply the belt with a greater amount of abrasive substance employed than will adhere to the same in its passage through the bath within the tank F. This is conveniently accomplished as follows:

N designates a suitable hopper located transversely above the belt, in the part thereof in front of the pulley D, said hopper being secured to an upwardly-extending plate A^{12} , connected with the standards A^2 . Said hopper is provided on its lower end with an opening, through which said abrasive substance may be discharged therethrough either by gravity or otherwise. As herein shown, said substance is discharged from the hopper by means of a rotative shaft N' , arranged longitudinally of the hopper and with the upper surface located within the discharge-opening thereof. Between the rear wall of the hopper and the shaft is left a narrow opening, through which the abrasive substance clinging to the shaft may pass, and the front wall of the hopper fits closely upon the shaft and acts when the latter is rotated to scrape said substance therefrom, which will fall upon the surface of the belt. Said shaft is journaled in a suitable bearing a^3 , connected with said plate A^{12} , and is provided on one end thereof, outside of the adjacent bearing, with a driving-pulley N^2 , which is connected by a belt with a pulley F^2 , attached to the outer end of the shaft f of the drum F. Said pulley N^2 is normally loose on the shaft N' and is adapted to be connected therewith when it is desired to rotate the

shaft through the medium of a sliding clutch P of ordinary construction. Said clutch is adapted to be actuated by means of a bell-crank lever P' , which is pivoted at its angle to a forwardly-extending arm a^4 , connected with the plate A^{12} , as shown in Fig. 6, said lever being connected at one end with said sliding clutch and at its other end with an endwise-movable rod P^2 , which extends at its opposite ends toward the forward end of the machine and has bearing in a suitable guide-arm a^5 , connected with one of the guides H. With this construction movement of said rod P^2 endwise acts to move said clutch to connect and disconnect the shaft and pulley.

In the operation of a machine constructed as thus described the tank F is first supplied with a desired abrasive fluid and the article to be polished—as, for instance, the board R shown in Fig. 2—is placed upon the carriage, said board being held thereon by gages $b\ b$, engaging the opposite ends thereof. The drum F' and carriage-actuating mechanism are then connected with the actuating mechanism, which gives movement to the belt and causes the carriage to move inwardly and carry the board under the polishing-belt and in contact therewith. Said machine will be so geared as to give the belt a speed relatively greater than that of the carriage when the active parts thereof move in the same direction, a proper proportion being about twenty to one—that is to say, the belt will travel about twenty feet while the carriage and article mounted thereon are moving one foot. The abrasive substance of the bath will cling to the belt and will be carried thereby to the surface of the board or other article which is being polished and applied to the surface by said belt under the pressure given thereto by the presser device. The action of said presser device will be regulated with reference to the article being polished, it being obvious that an article having a hard surface, such as a marble slab, will require a greater pressure than one made of a less dense or hard material. Owing to the construction of the presser device described, in which the rollers are made relatively small and each individual roller is independently movable, all part of the surface of the article being polished is subjected to practically the same pressure, notwithstanding said surface may be irregular and uneven. This would obviously not be true if the rollers were made of a length equal to the width of the belt or were not independently movable, as in that case any depression in the surface being polished would not have proper contact with the polishing-belt. When water is used as an ingredient of the bath within the tank, it will serve to reduce the heat due to friction between the belt and the article being polished. The upper surface of the carriage will desirably be provided with a trough-like depression or groove B' , located near its edges and extending around the same, adapted to receive the

water pressed out of the belt during the polishing action thereof. Said groove will be provided with a drainage-aperture, through which the water may be drained to any desired point, preferably to the tank F. Owing to the relative speed of the carriage and polishing-belt such articles as boards or pieces of furniture which it is desired to polish after the same have received the required number of coats of varnish will usually receive the required finish after passing once under the polishing-belt. Should further polishing be required, the machine may be reversed and the article passed under the belt again, and this operation repeated as often as required.

So far as the main features of the invention are concerned, the carriage may be made of any required form to accommodate the article to be polished. For instance, it may be desirable in some cases to polish the tops of such articles of furniture as tables, bureaus, and the like after the same have been set up, in which case a different form of carriage would obviously need to be employed. Furthermore, it is obvious that the same results would be secured, especially for small articles, if the presser device were located under the belt and adapted to press upwardly and the article to be polished were applied to and held upon the belt by manual force.

I claim as my invention—

1. The combination with a bed, of an endless traveling belt, a portion of which is parallel with the upper surface of said bed, a tank adapted to contain an abrasive bath through which said belt passes, and means for moving said parallel portion of the belt toward and from the bed without disturbing the relation thereof to said tank.

2. The combination with a bed, of an endless traveling belt, a tank adapted to contain an abrasive bath, and a pulley in said tank adapted to be submerged in said bath and around which said belt is trained.

3. The combination with an endless traveling belt, and supporting-rollers for the same, of a tank adapted to contain an abrasive bath, a pulley in said tank adapted to be submerged in said bath and around which said belt is trained, and a presser applied to a portion of the belt.

4. The combination with a belt and a traveling carriage thereon, of an endless traveling belt a portion of which is located above and parallel with the upper surface of said carriage, a tank adapted to contain an abrasive bath, a pulley in said tank adapted to be submerged in said bath and around which said belt is trained, and a presser applied to said parallel portion of the belt.

5. The combination of an endless traveling belt, supporting-pulleys for the same, and a presser consisting of a plurality of independently-movable presser elements adapted to engage said belt, said presser elements having bearing-surfaces of small area and ar-

ranged in sets which extend transversely across the belt.

6. The combination of an endless traveling belt, supporting-pulleys for the same, and a presser consisting of a plurality of independently-movable spring-pressed presser elements adapted to engage a portion of said belt, said presser elements having bearing-surfaces of small area and arranged in sets which extend transversely across the belt.

7. The combination of an endless traveling belt, supporting-pulleys for the same, and a presser consisting of a plurality of sets of presser-rollers each set comprising a plurality of independently-movable presser-rollers arranged transversely of the belt and adapted to engage a portion of said belt.

8. The combination with an endless traveling belt and supporting-pulleys for the same, of a presser consisting of a plurality of independently-movable presser-rollers adapted to engage a portion of said belt, said rollers being arranged in sets extending across the belt and the rollers of the several sets being arranged in overlapped relation.

9. The combination with an endless traveling belt and supporting-pulleys for the same, of a tank adapted to contain an abrasive bath, a pulley in said tank adapted to be submerged in said bath and around which said belt is trained, and a presser consisting of a plurality of independently-movable presser elements adapted to engage said belt.

10. The combination of an endless traveling belt, supporting-pulleys for the same, a presser comprising a plurality of independently-movable presser elements adapted to engage a portion of said belt, and means for moving said presser as a whole with respect to the portion of said belt engaged thereby.

11. The combination with a bed, a traveling carriage thereon, and a traveling endless belt a portion of which is located parallel with the supporting-surface of said carriage, of a tank adapted to contain an abrasive bath, a pulley in said tank adapted to be submerged in said bath and around which said belt is trained, and a presser engaging the side of the belt opposite to that of the article which is being polished.

12. The combination of a bed, a vertically-movable belt-frame and supporting-pulleys, a portion of said belt being parallel with the bed of a tank adapted to contain an abrasive bath, a pulley in said tank adapted to be submerged in said bath and around which said belt is trained, a presser connected with said belt-frame and applied to a portion of the belt, and means for adjusting said belt-frame and presser device with respect to the said bed.

13. The combination of a bed, a vertically-movable belt-frame, upright guides for said frame, a traveling belt trained about supporting-pulleys on said belt-frame, a tank adapted to contain an abrasive bath through

which said belt passes, a presser connected with said belt-frame and acting on a portion of the belt, and means for adjusting said belt-frame and presser device embracing rack-and-pinion mechanism connected with said frame and guides.

14. The combination with a bed, a vertically-movable belt-frame, and a traveling belt trained about supporting-pulleys on said belt-frame, of a tank adapted to contain an abrasive bath, a pulley in said tank adapted to be submerged in said bath and around which said belt is trained, a presser connected with said belt-frame and acting on a portion of the belt, and means for giving movement to said presser with respect to said belt-frame.

15. The combination of a bed, a vertically-movable belt-frame, a traveling belt trained about supporting-pulleys on said belt-frame, a tank adapted to contain an abrasive bath through which said belt passes, a presser connected with said belt-frame and applied to a portion of the belt, said presser consisting of a plurality of independently-movable presser elements, and means for giving vertical movement to said presser with respect to said belt-frame.

16. The combination of an endless traveling belt, a presser applied to a portion of the belt, a tank adapted to contain an abrasive bath through which said belt passes, and supporting-rollers for the belt, one of said rollers being mounted in a movable bearing.

17. The combination of a plurality of pulleys having their axes arranged parallel with each other, an endless abrasive belt trained about the same, and means for tilting one of said pulleys to incline the axis thereof to the axes of the other pulleys.

18. The combination of a plurality of pulleys having their axes arranged parallel with each other, and an endless belt trained about

the same, one of said pulleys being supported by means permitting it to be oscillated about an axis parallel with the axis of said pulley and to be also tilted to incline its axis to the axes of the other rollers.

19. The combination of an endless traveling belt, supporting-rollers for the same, a tank adapted to contain an abrasive bath through which said belt passes, and a hopper located above said belt and arranged to discharge its contents thereon.

20. The combination with an endless traveling belt, of a vertically-adjustable belt-carrying frame, a tank for containing an abrasive bath, and supporting-pulleys for the belt, some of which are mounted on the belt-carrying frame, and which are located in position to maintain portions of the belt between the tank and carrying-frame in a horizontal position to permit vertical adjustment of the frame without loosening the belt.

21. The combination with a bed and an endless traveling belt, of a tank adapted to contain an abrasive bath through which said belt passes, and pressing or squeezing rollers applied to said belt above said bath.

22. The combination with a traveling work-carrying carriage, and an endless traveling belt, of a tank adapted to contain an abrasive bath through which said belt passes, and means for giving longitudinal movement to said carriage and for moving said belt, said belt being driven at a speed relatively greater than said carriage.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 1st day of April, A. D. 1899.

ALBERT HUSEBY.

Witnesses:

STUART H. BROWN,
WILLIAM L. HALL.