No. 705,232. Patented July 22, 1902.

J. A. HALLDEN.

SANDPAPERING MACHINE

(Application filed Sept. 6, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1

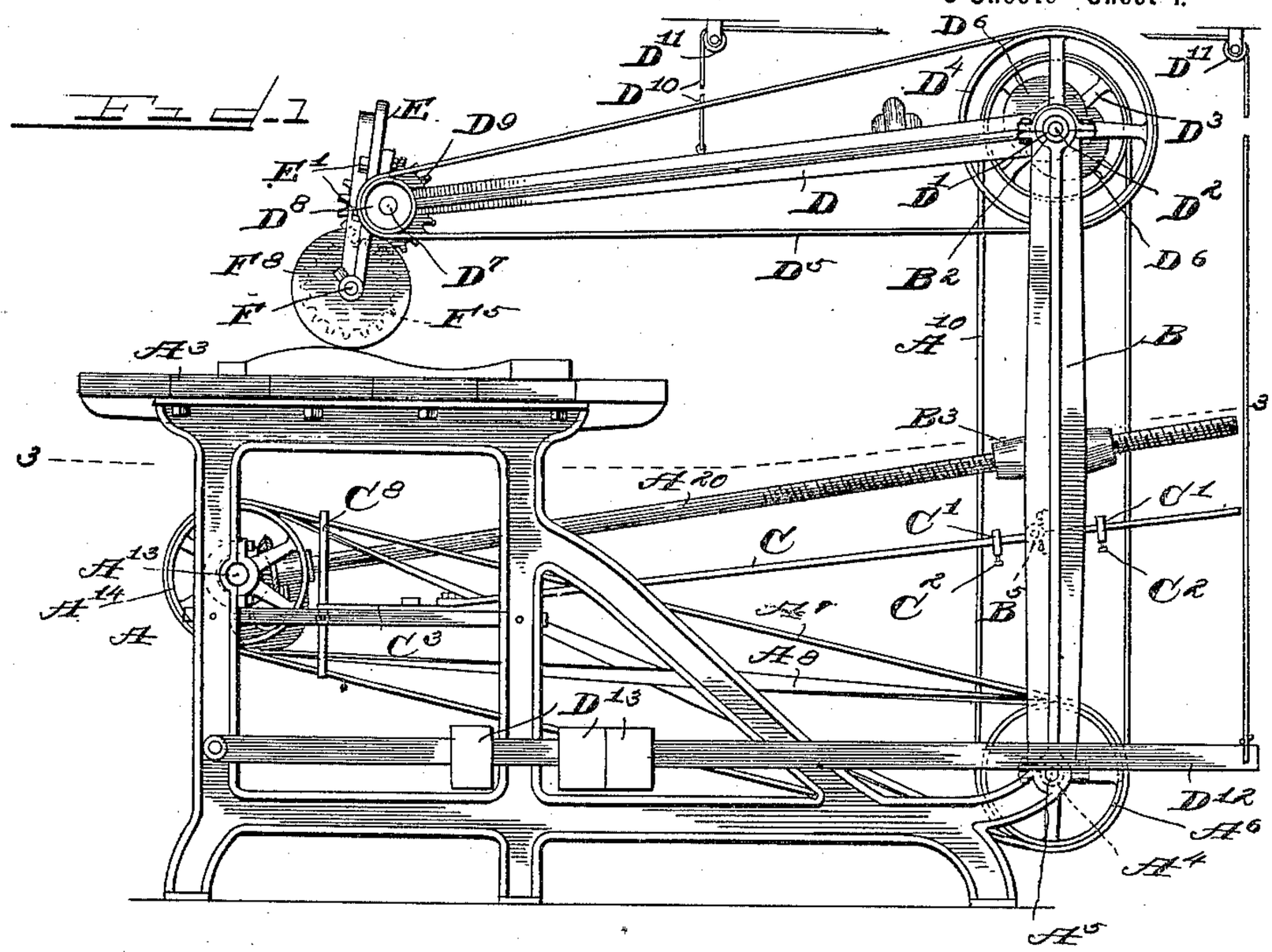
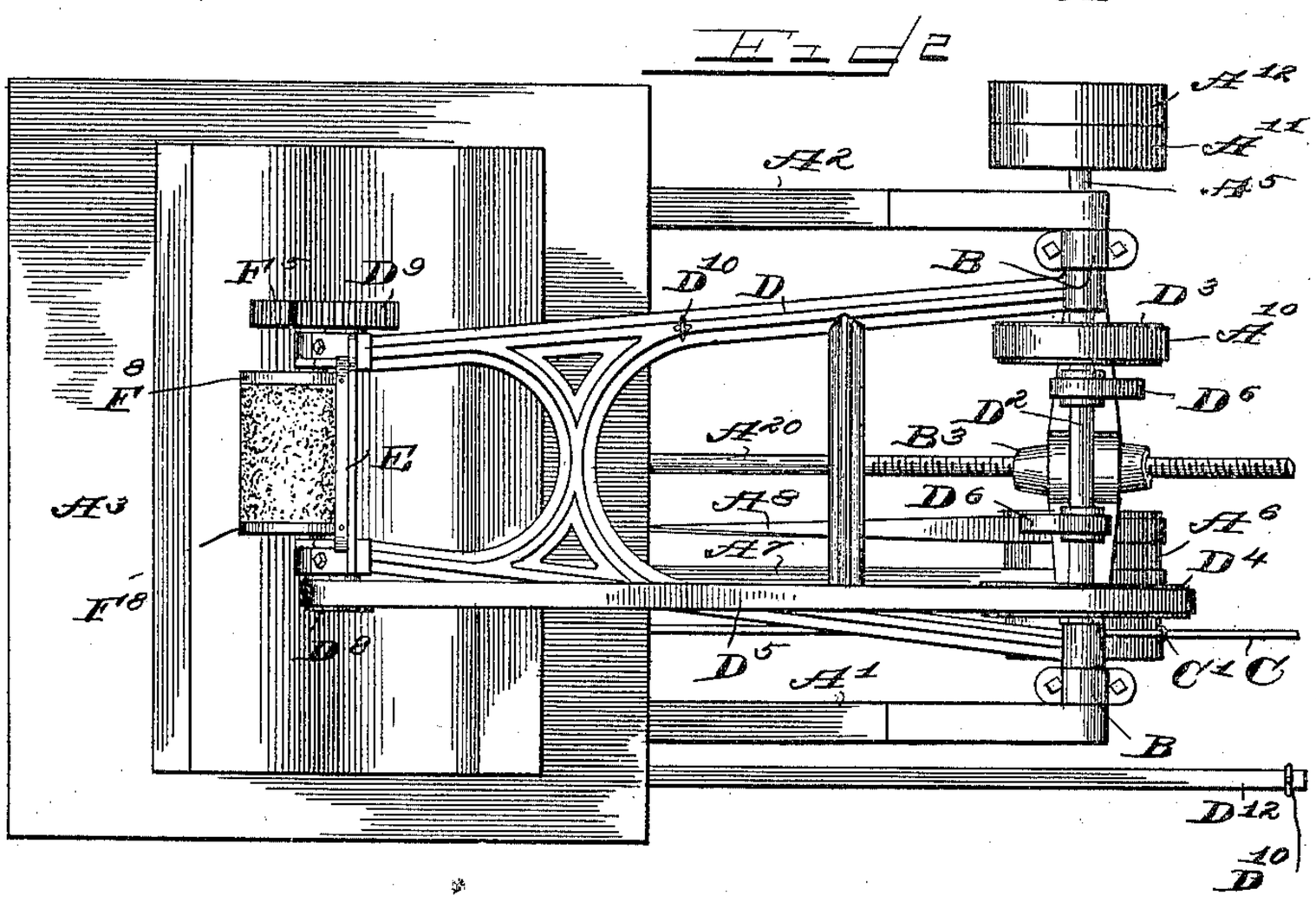


Fig. 2



Witnesses.

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(No Model.) 3 Sheets—Sheet 2.

Fig. 3.

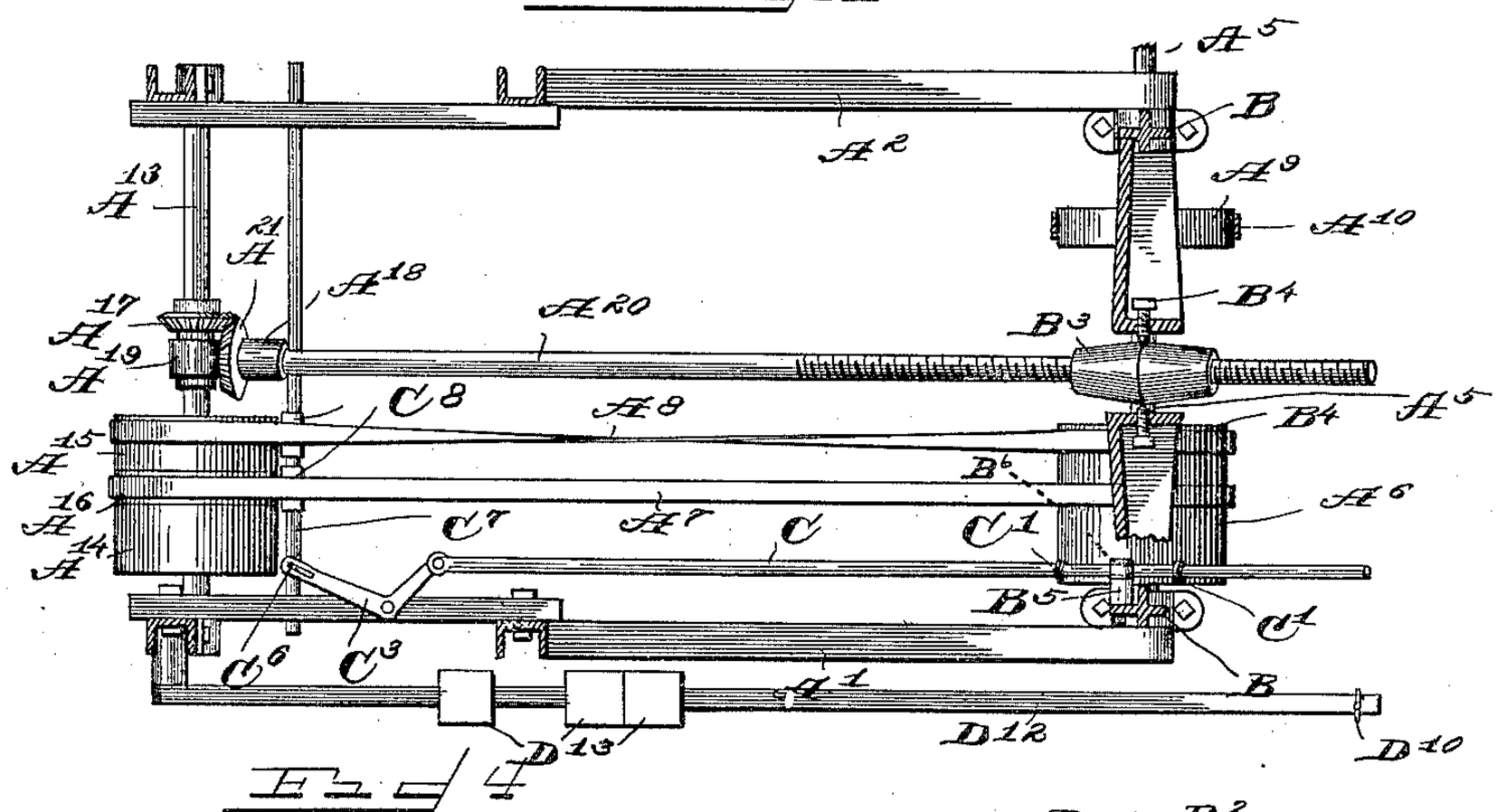


Fig. 4.

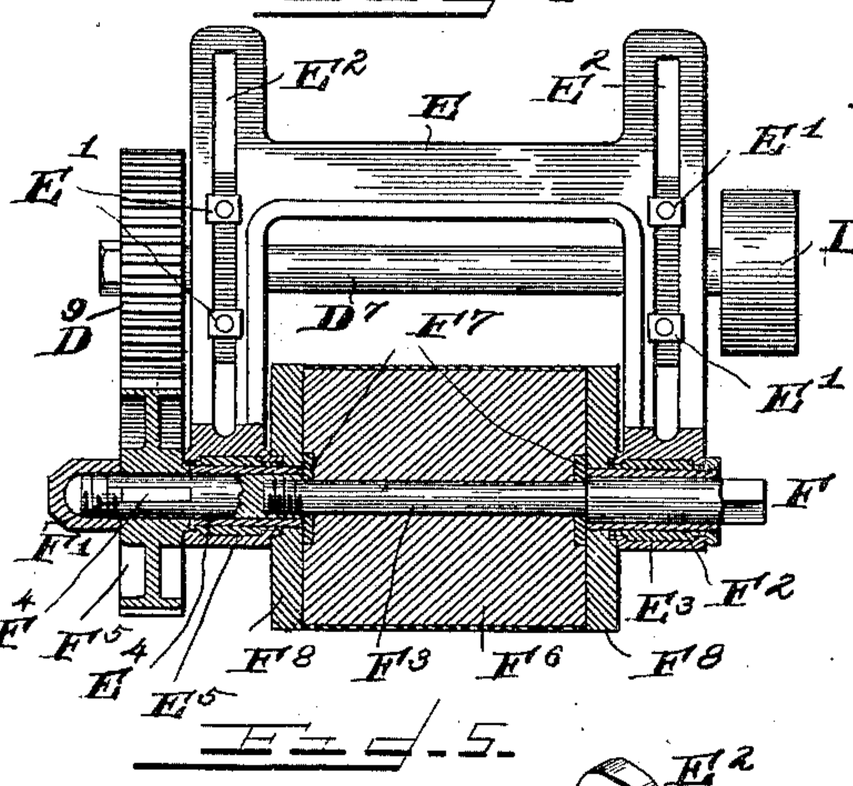


Fig. 5.

Fig. 10.

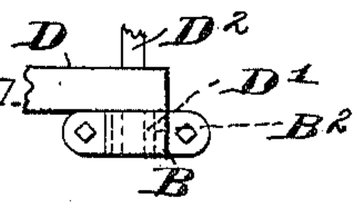


Fig. 11.

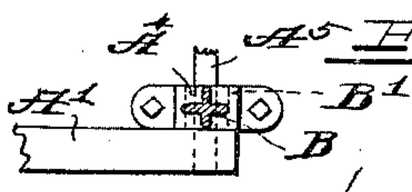
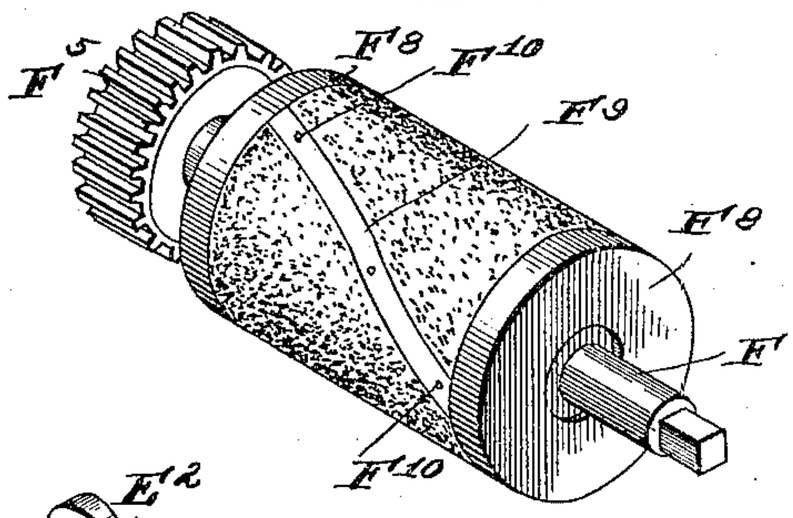
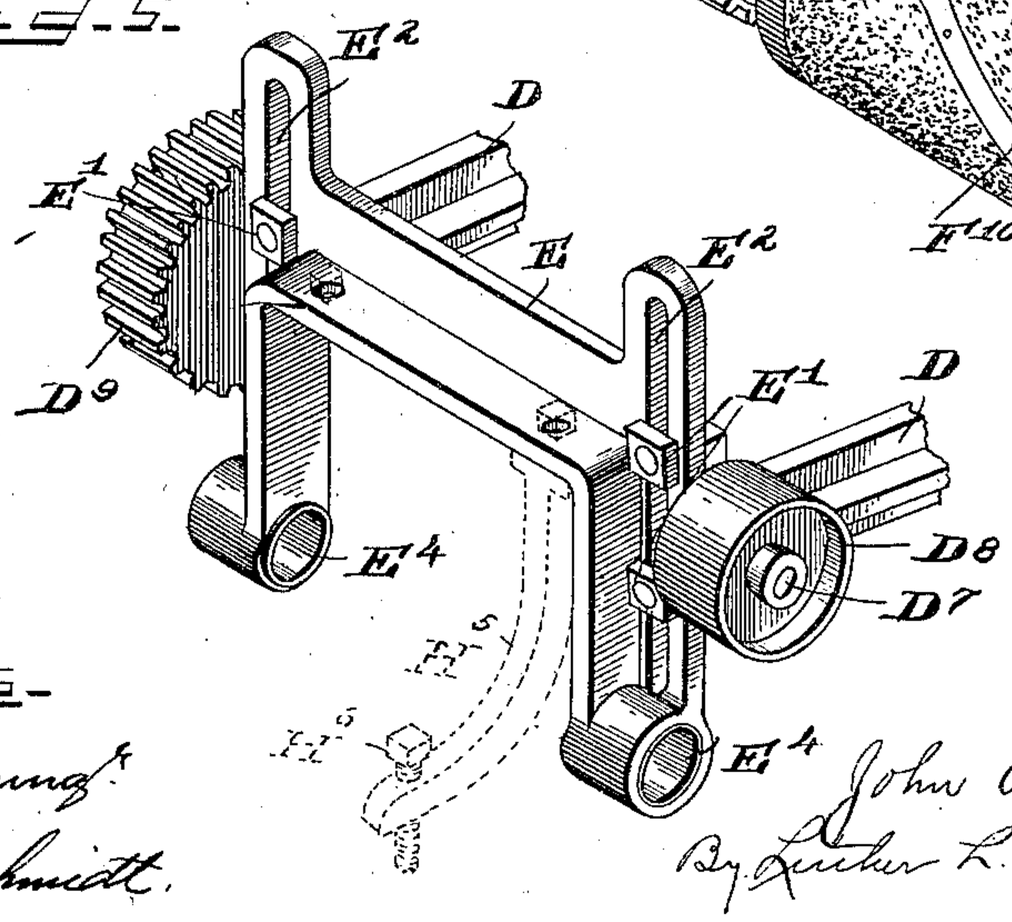


Fig. 6.





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SANDPAPERING MACHINE.

(Application filed Sept. 6, 1901.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 7.

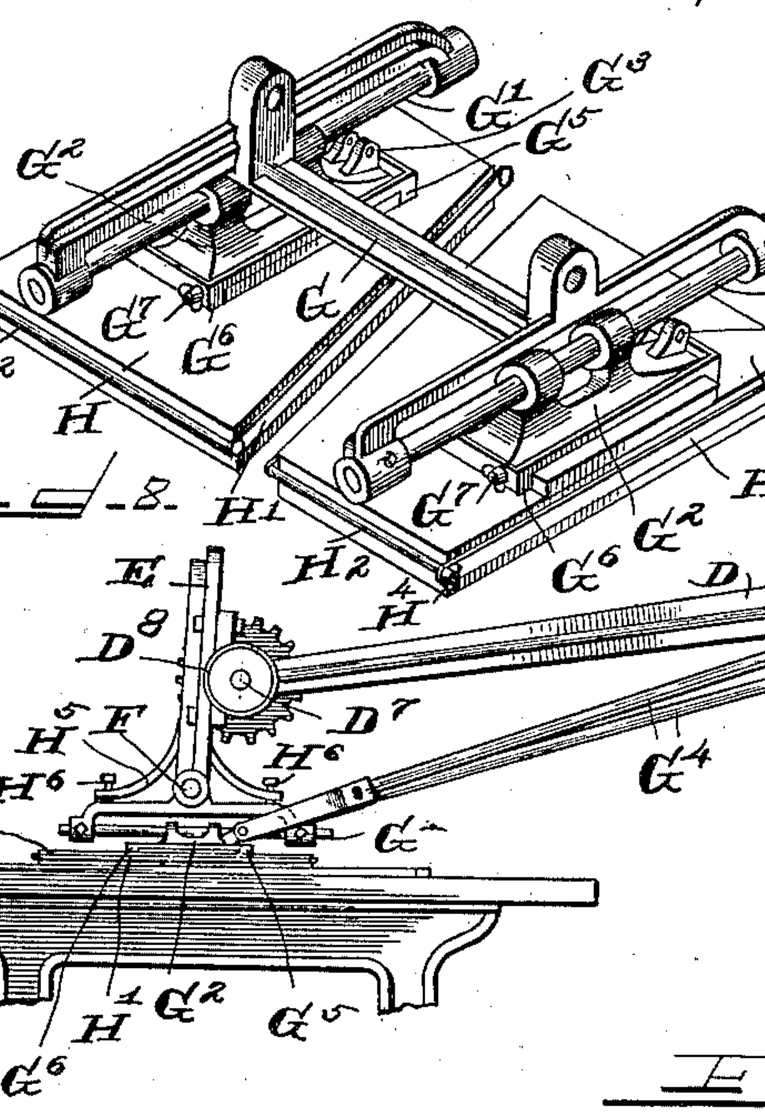


Fig. 8.

Fig. 9.

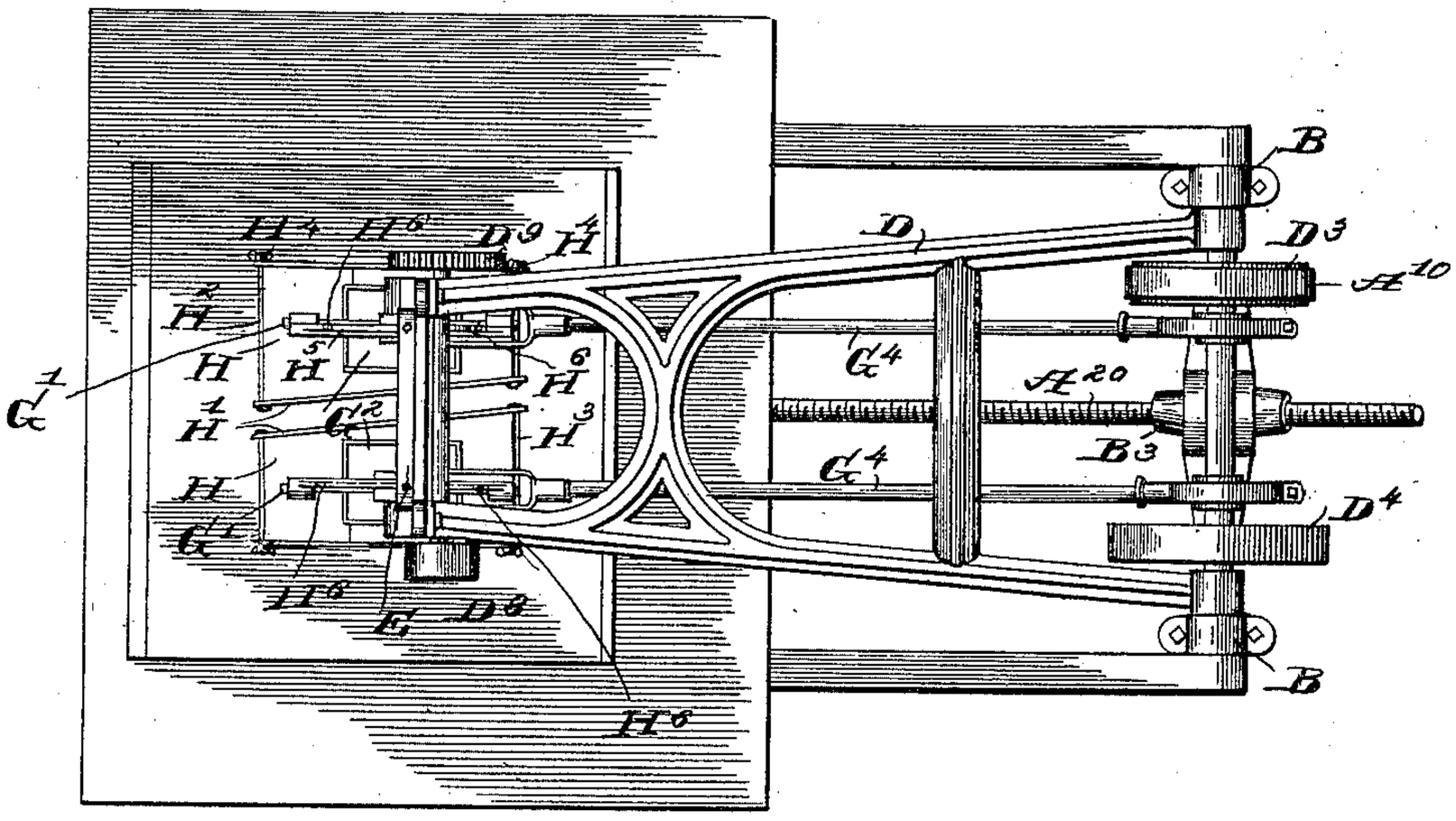
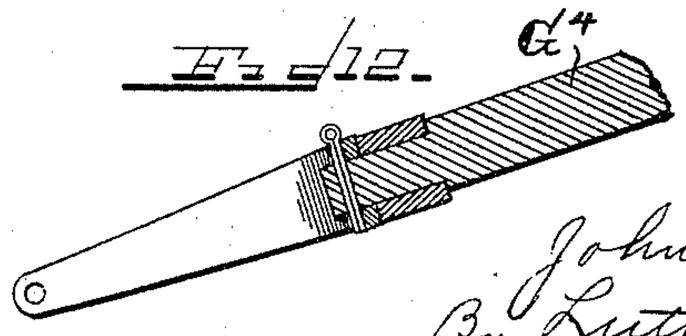


Fig. 12.



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UNITED STATES PATENT OFFICE.

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SANDPAPERING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 705,232, dated July 22, 1902.

Application filed September 6, 1901. Serial No. 74,508. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. HALLDEN, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Sandpapering-Machines, of which the following is a specification.

The object of this invention is the production of an improved sandpapering-machine.

In the accompanying drawings, Figure 1 is a side elevation of a sandpapering-machine embodying the features of my invention. Fig. 2 is a top plan view of said machine. Fig. 3 is a section on dotted line 3 3 of Fig. 1, showing the mechanism for shifting the belts that move the sandpapering device bodily forward and backward upon the work-table. Fig. 4 is a front elevation, partly in section, of the yoke for supporting the sandpapering device. Fig. 5 is a perspective view of said yoke, together with a portion of the frame upon which the yoke is mounted. Fig. 6 is a detached view of the sandpapering-roller and its bearing-shaft. Fig. 7 is a perspective view illustrating a form of the sandpapering device adapted to finish flat surfaces. Fig. 8 is a side elevation of the sandpapering device illustrated in the last-preceding figure with the eccentrics and eccentric-rods for reciprocating the rubbing-blocks of said sandpapering device. Fig. 9 is a top plan view of a sandpapering-machine equipped with the rubbers shown in the two last-preceding figures. Fig. 10 is a fragmental top plan view showing the upper trunnion-joint between the upright tilting frame and the forwardly-extending arm which carries the sandpapering device. Fig. 11 is a similar view, partly in section, of the pivotal joint between the supporting-frame and the lower end of the tilting frame. Fig. 12 illustrates the forward end of one of the eccentric-rods.

Like letters of reference indicate corresponding parts throughout the several views.

In the embodiment herein shown and described of this invention I provide a supporting-frame having a work-table thereon. An upwardly-extending tilting frame is pivotally mounted upon the supporting-frame rearward of the work-table, and at its upper or free end carries a pivoted arm to which the sandpapering device is connected. A screw-threaded shaft is rotatably mounted within said supporting-frame, said shaft being provided with a sleeve loosely held within the tilting frame, and by means of a shifting device operating upon a straight and a crossed belt said threaded shaft is rotated alternately in opposite directions to oscillate the tilting frame and move the sanding device bodily forward and backward relatively to the work-table.

In the construction of this sandpapering-machine I provide a supporting-frame A, comprising the two side members A' and A^2 and the work-table A^3, secured to the tops of said side members. At the rear extremities of the side members A' and A^2 and formed integral therewith are two alined hollow bearing-trunnions A^4, within which the shaft A^5 is rotatably mounted and upon which trunnions an upright tilting frame, to be hereinafter more fully described, is pivotally supported. The shaft A^5 is provided with the tight pulley A^6, carrying the straight and the crossed belts A^7 and A^8. It is also provided with the tight-pulley A^9, having a belt A^{10} for conveying motion to the upper part of the tilting frame and with the drive-pulley A^{11} and the corresponding loose pulley A^{12}.

In the forward part of the frame A a shaft A^{13} is rotatably supported. This shaft carries two loose pulleys A^{14} and A^{15}, with a tight pulley A^{16} between them. The pulleys A^{14}, A^{15}, and A^{16} are of the same diameter and are adapted to carry the straight belt A^7 and the crossed belt A^8, said belts being thrown alternately from their loose pulleys onto the intermediate tight pulley by a belt-shifter, as will hereinafter more fully appear. The shaft A^{13} is also provided with the miter-gear A^{17} and with a bracket A^{18}, pivotally connected, by means of its bearing-sleeve A^{19}, with the shaft A^{13} to provide a bearing for the forward end of the screw-threaded shaft A^{20}. The said shaft A^{20} has fixed to its forward end a miter-gear A^{21}, meshing with the gear A^{17} on the shaft A^{13}.

B is the upright tilting frame hereinbefore mentioned. It is pivotally mounted upon the hollow trunnions A^4 by means of the bearing-

openings B′ at its lower end. At its upper end it is provided with similar bearing-openings B^2 and intermediate its ends with an internally-screw-threaded sleeve B^3, adapted to receive the screw-threaded shaft A^{20}. This sleeve is pivotally mounted in the tilting frame B between the conical ends of two set-screws B^4, and therefore is susceptible of an oscillatory or rocking movement upon said set-screws. At one side of the tilting frame B, I provide an oscillatory stud B^5, pivotally supported upon said frame. This stud has a transverse opening B^6, extending therethrough, adapted to receive a longitudinally-movable rod for shifting the belts A^7 and A^8 to change the rotative direction of the screw-threaded shaft A^{20}. C is said longitudinally-movable rod. It is provided with the stop-collars C′, adjustable lengthwise of said rod by means of the set-screws C^2. As before stated, the rod C passes through the transverse opening B^6 in the oscillatory stud B^5 and at its forward end is pivotally connected with the bell-crank lever C^3. This bell-crank lever is mounted upon a portion of the side A′ of the framework A. The other arm of the lever is slotted to receive a pin C^6, fixed in a shifter-rod C^7, mounted in bearings in said supporting-frame and adapted to be moved longitudinally in said bearings. The shifter-rod C^7 is provided with loops C^8 to encircle the belts A^7 and A^8 to shift said belts from their loose pulleys to the tight pulley.

A forwardly-extending arm or frame D is provided with outwardly and oppositely extending alined hollow trunnions D′. These trunnions are intended to lie within the bearing-openings B^2 at the upper end of the tilting frame B and the axial openings of the trunnions to receive a rotatable shaft D^2. The shaft D^2 has a tight pulley D^3 thereon, intended to receive the belt A^{10} from the pulley A^9; also, a tight pulley D^4, adapted to carry a belt D^5. The shaft D^2 also has fixed upon it oppositely-extending eccentrics D^6. A rotatable shaft D^7 is mounted in suitable bearings at the forward end of the arm D, the pulley D^8, fixed thereon, being adapted to receive the belt D^5, passing over the pulley D^4. At its opposite end the shaft D^7 has fixed a spur-pinion D^9, adapted to mesh with a similar pinion, to be later mentioned, for rotating the sanding-drum. The arm D is counterbalanced by means of the cord D^{10}, extending upward and over the sheaves D^{11}, thence passing downward and connecting with the free end of a pivoted lever D^{12}, the weights D^{13}, slidably movable along said lever, being adapted to properly counterbalance the weight upon the arm D.

E is a yoke secured to the forward end of the arm D by means of the bolts E′. This yoke is provided with two elongated openings E^2, through which the bolts E′ extend, which elongated openings are intended to permit adjustment of the yoke for different sizes of spur-pinions, whereby changes in speed of the sanding-drum are obtained. The lower arms of the yoke E are provided with alined bearing-openings E^3 for receiving a two-part shaft to be later described. In this instance the bearings E^3 are formed by inserting two brass sleeves E^4 in suitable openings in the arms of the yoke E, securing said sleeves in place by a filling of Babbitt metal E^5. F is said two-part shaft. It comprises two enlarged end portions F′ and F^2 and the body portion F^3, the latter being of a less diameter than said end portions and being formed integral with the end portion F^2. The end portion F′ is hollow and internally screw-threaded at its inner end to receive the correspondingly-screw-threaded end of the body portion F^3. At its opposite or outer end the end portion F′ is externally screw-threaded and inward of this screw-threading is provided with the spline F^4 to hold a spur-pinion F^5, slotted to receive said spline and prevent said spur-pinion F^5 from rotation relatively to said shaft F. This spur-pinion is intended to mesh with the corresponding pinion D^9, fixed on the shaft D^7, and to communicate rotatory motion to the sanding-drum. F^6 is said sanding-drum mounted upon the body portion F^3 of said two-part shaft F, metallic washers F^7, inset at the ends of the drum, providing bearing-surfaces for the shoulders formed by the end portions F′ and F^2 of the shaft F, thus permitting the drum to be held rigid with said shaft. The end portion F^2 is squared at its outer end to receive a wrench. At each end of the sanding-drum and mounted loosely upon the brass sleeves E^4 are two circular disks F^8 of a diameter substantially equal to the outer diameter of said drum. I form one of said disks slightly (say about one thirty-second of an inch) less in diameter than the other, the smaller disk being intended to run upon the unsanded surface of the work as the drum F^6 is moved forward and backward across the table. This difference in diameter of said disks therefore governs the depth of the "cut" made by the sanding-drum. Said disks also act as guards to prevent an excessive cutting away of the surface which is being smoothed by the drum. Sandpaper is wrapped around the drum F^6 and its end held in place by means of the spiral binding-strip F^9, adapted to be depressed below the peripheral surface of the drum into a suitable channel formed in said drum. The strip is held in place by the screws F^{10}. This spiral binding-strip obviates the "flat side" on the sanding-drum which a strip extending straight across the face of the drum would cause.

A sandpapering device for finishing flat surfaces will next be described.

A yoke G of said last-mentioned device is secured upon the two-part shaft F between the lower ends of the yoke E in the same manner as the sanding-drum is there held in place. The yoke G is provided with two guide-rods G′, upon which are supported and guided

two clamping-blocks G^2 for holding the sanding-blocks, to be later herein described. These clamping-blocks are provided with perforated ears G^3 at their rear ends for pivotally connecting said blocks with the eccentric-rods G^4, by means of which connection said clamping-blocks are reciprocated upon the guide-rods G'. The upper side of each of the clamping-blocks is surrounded with a raised rim adapted to retain the oil which may drip from the guide-rods G'. On their under sides the clamping-blocks are provided at their opposite ends with the holding-ribs G^5 and G^6, the latter of which are provided with set-screws G^7. The sanding-blocks H have raised middle portions adapted to enter between the ribs G^5 and G^6 of the under side of the clamping-block G^2 and be held in position between said ribs by an adjustment of the set-screws G^7. The lower portion or body of each of the sanding-blocks is provided at its inner and outer edges with channels adapted to receive the half-round metallic pieces H', perforated at their ends to receive the clamping-rods H^2 and H^3, each of which rods is threaded at its ends and provided with a wing-nut H^4. The inner ends of the blocks H are tapered, so that they may overlap and no unsanded portion shall remain between them when the machine is in operation. Sandpaper is removed from the rubbing-blocks H by unscrewing the wing-nuts H^4 and removing the frame composed of the half-round bars H' and their clamping-rods H^2. To put sandpaper upon the rubbing-blocks, a piece of a suitable size is cut and folded over the lower face of the blocks H. The bars H' are then placed against the sandpaper at the forward and rear edges of the rubbing-blocks, the rods H^2 put through the perforations in the ends of said bars, and the bars drawn into their grooves in the edges of the blocks by tightening the wing-nuts H^4. The rubbing-blocks H are formed with diagonally-cut inner ends. This prevents their passing one another, but insures the sanding of the entire surface over which they travel, which would not be the case if a longitudinal space were left between their adjacent ends. Arms H^5, extending downward from the yoke E, are provided with set-screws H^6, passing through threaded openings in the outer ends of said arms. These set-screws bear upon opposite ends of the yoke G and prevent the oscillation of the latter upon the two-part shaft F. They also permit an adjustment of the position of the yoke G, so that the sanding-blocks may be caused to reciprocate in a plane at an angle with the surface of the work-table A^3.

In the operation of this sandpapering-machine rotatory motion is imparted to the sanding-drum F^6 from the drive-pulley A^{11}. Said drum will be reciprocated forward and back over the work-table by the tilting frame B, said frame being moved forward by the rotation of the screw-threaded shaft A^{20} until the oscillatory stud B^5 engages the stop-collar C' and pushes the rod C forward, shifting the straight belt A^7 from the tight pulley A^9 and throwing the crossed belt A^8 upon said tight pulley. This reverses the motion of the screw-threaded shaft A^{20} and causes the tilting frame B to be oscillated in a contrary direction. The frame moves backward until the oscillatory stud B^5 engages the rear stop-collar C' on the rod C and pulls said rod rearward, shifting the crossed belt from the tight pulley and throwing the straight belt upon said tight pulley, again changing the rotative direction of said screw-threaded shaft and moving the tilting frame forward.

The amount of downward pressure of the sanding-drum is regulated by moving the weights D^{13} longitudinally of the pivoted lever D^{12}. They may be placed so that a considerable downward pressure will be exerted by the drum upon the work or in such a manner that the drum will bear but lightly upon the surface being sanded. Sandpaper is held upon the drum by means of the binding-strip F^9, placed in the channel extending diagonally across the peripheral surface of said drum. The diagonal position of the binding-strip does away with a flat face or indentation in said drum, which would be caused by the strip were it placed parallel with the drum's axis. Spur-pinions F^5 of different size may be used to change the speed of rotation of the sanding-drum, the yoke E being adjusted to obtain the proper engagement between the spur-gear D^9 and said gear F^5.

When a flat surface is to be sanded, the sanding-drum F^6 is removed by separating the parts F' and F^3 of the shaft F, removing the drum therefrom, and substituting the yoke G, passing the shaft F through the perforations in said yoke adapted for its reception. If the work is level, the plane of the guide-rods G' is adjusted by means of the set-screws H^6. The eccentric-rods G^4 are then connected with the clamping-blocks G^2 at the forward ends of said eccentric-rods and to the eccentrics D^6 at the rear ends of said rods. Sandpaper is folded over the rubbing-blocks H, and said blocks are held firmly in the clamping-blocks by means of the set-screws G^7. When motion is imparted to the machinery, the rubbing-blocks H are rapidly reciprocated forward and backward by means of their connection with the eccentrics D^6 on the shaft D^2, and the sanding device is bodily reciprocated forward and backward over the work-table by means of the reversal of the rotative direction of the screw-threaded shaft A^{20}. The sanding-drum is employed for uneven surfaces, the diameter of the drum being made suitable for the curves of the work to be done.

The amplitude of the forward-and-back movement of the sanding device (either the drum F^6 or the sanding-blocks H) is regulated by the position of the stop-collars C' on the rod C. If the stop-collars are near together, the amplitude of the forward-and-

back movement of the sanding device will be small, but if far apart said amplitude will be sufficient to include the length of the work-table A^3.

While I have described my invention in its application to sandpapering-machines, it is clear that it may be embodied in apparatus for polishing or abrading glass, stone, metal, or other material.

I claim as my invention—

1. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; a sandpapering device supported by said tilting frame; means for actuating said sandpapering device; a screw-threaded shaft having a connection with said tilting frame; and means for rotating said shaft to oscillate said frame and reciprocate the sanding device with relation to the supporting-frame.

2. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; an arm having a pivotal connection with said tilting frame; a sandpapering device supported by said arm; means for actuating said sandpapering device; a screw-threaded shaft having a connection with said tilting frame; and means for rotating said shaft to oscillate said tilting frame and reciprocate the sanding device relatively to the supporting-frame.

3. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; a sandpapering device supported by said tilting frame; means for actuating said sandpapering device; a screw-threaded shaft having connection with said tilting frame; means for rotating said shaft in opposite directions; and means adapted to be operated by the movement of said tilting frame for changing the rotative direction of said screw-threaded shaft.

4. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; a sandpapering device supported by said tilting frame; means for actuating said sandpapering device; a shaft having a screw-thread engagement with a portion of said tilting frame; means for rotating said shaft in opposite directions; and means adapted to be operated by the movement of said tilting frame for changing the rotative direction of said shaft.

5. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device; means for supporting the sandpapering device; means for reciprocating the sandpapering device with relation to its supporting means; and means for reciprocating said supporting means with relation to the frame.

6. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device; an arm for supporting said sandpapering device; means for reciprocating said sandpapering device with relation to said arm; and means for reciprocating said arm with relation to said supporting-frame.

7. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device; an arm for supporting said sandpapering device; means for reciprocating the sandpapering device with relation to said arm; a tilting frame for reciprocating said arm with relation to the supporting-frame; and means for oscillating said tilting frame.

8. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device; an arm for supporting said sandpapering device; means for reciprocating said sandpapering device with relation to said arm; a tilting frame for reciprocating said arm with relation to the supporting-frame; a shaft having a screw-thread engagement with said tilting frame; and means for rotating said shaft in opposite directions.

9. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device; an arm for supporting said sandpapering device; means for reciprocating the sandpapering device with relation to the arm; a tilting frame for reciprocating said arm with relation to the supporting-frame; a shaft having a screw-thread engagement with said tilting frame; means for rotating said shaft; and means adapted to be operated by the movement of said tilting frame for changing the rotative direction of said shaft.

10. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device having a plurality of independent abrading-surfaces; means for supporting the sandpapering device; means for reciprocating said independent abrading-surfaces in contrary directions with relation to each other; and means for reciprocating said supporting means with relation to the frame.

11. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device having a plurality of independent abrading-surfaces; an arm for supporting said sandpapering device; means for reciprocating said independent abrading-surfaces in contrary directions with relation to each other; a tilting frame for reciprocating said arm with relation to the supporting-frame; and means for oscillating said tilting frame.

12. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device having a plurality of independent abrading-surfaces; an arm for supporting said sandpapering device; means for reciprocating said independent abrading-surfaces in contrary directions with relation to each other; a tilting frame for reciprocating said arm with relation to the supporting-frame; a shaft having a screw-thread engagement with said tilting frame; and means for rotating said shaft in opposite directions.

13. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering

device having a plurality of independent abrading-surfaces; an arm for supporting said sandpapering device; means for reciprocating the independent abrading-surfaces in contrary directions with relation to each other; a tilting frame for reciprocating said arm with relation to the supporting-frame; a shaft having a screw-thread engagement with said tilting frame; means for rotating said shaft; and means adapted to be operated by the movement of said tilting frame for changing the rotative direction of said shaft.

14. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device having a plurality of rubbing-blocks; an arm for supporting said sandpapering device; guides for said rubbing-blocks; means for moving said rubbing-blocks upon said guides in contrary directions with relation to each other; a tilting frame for reciprocating said arm with relation to the supporting-frame; a shaft having a screw-thread engagement with said tilting frame; means for rotating said shaft; and means adapted to be operated by the movement of said tilting frame for changing the rotative direction of said shaft.

15. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device having a plurality of rubbing-blocks; an arm for supporting said sandpapering device; a guide-rod for each of said rubbing-blocks; two oppositely-extending eccentrics; eccentric-rods connecting said eccentrics with said rubbing-blocks; means for rotating said eccentrics to move said rubbing-blocks upon said guide-rods; a tilting frame for reciprocating said arm with relation to the supporting-frame; a shaft having a screw-thread engagement with said tilting frame; means for rotating said shaft; and means adapted to be operated by the movement of said tilting frame for changing the rotative direction of said shaft.

16. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device comprising two rubbing-blocks; means for reciprocating said blocks in contrary directions with relation to each other; and means for bodily moving the sandpapering device forward and backward with relation to the supporting-frame.

17. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device comprising two rubbing-blocks, the adjacent edges of which rubbing-blocks are formed at an angle with the line of movement of said blocks; and means for reciprocating said blocks in contrary directions with relation to each other.

18. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device comprising two rubbing-blocks, the adjacent edges of which rubbing-blocks are formed at an angle with the line of movement of said blocks; guides for said rubbing-blocks; and means for moving said rubbing-blocks in opposite directions upon said guides.

19. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device comprising two rubbing-blocks, the adjacent edges of which rubbing-blocks are formed at an angle with the line of movement of said blocks; guides for said rubbing-blocks; means for moving said rubbing-blocks in opposite directions upon said guides; and means for reciprocating the sandpapering device bodily forward and backward.

20. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device comprising two rubbing-blocks, the adjacent edges of which are formed at an angle with the line of movement of said blocks; an eccentric for reciprocating one of said rubbing-blocks; a tilting frame for moving said sandpapering device bodily forward and backward; means for rotating said eccentrics; and means for oscillating said tilting frame.

21. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; a sandpapering device supported by said tilting frame; means for actuating said sandpapering device; a counterbalance-lever for said sandpapering device; a shaft having a screw-thread engagement with a portion of said tilting frame; means for rotating said shaft in opposite directions; and means adapted to be operated by the movement of said tilting frame for changing the rotative direction of said shaft.

22. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; a pivoted arm connected with said tilting frame; a sandpapering device mounted on said pivoted arm; an eccentric for actuating said sandpapering device; a shaft having a screw-thread engagement with a portion of said tilting frame; means for rotating said shaft in opposite directions; and means adapted to be operated by the movement of said tilting frame, for changing the rotative direction of said shaft.

23. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; an arm pivotally connected with said tilting frame; a sandpapering device mounted on said arm; two eccentrics for actuating said sandpapering device; a counterbalance-lever for said sandpapering device; a connection between the pivoted arm and said counterbalance-lever; a shaft having a screw-thread engagement with a portion of said tilting frame; means for rotating said shaft in opposite directions; and means adapted to be operated by the movement of said tilting frame for changing the rotative direction of said shaft.

24. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame

pivotally mounted with relation to said supporting-frame; a sandpapering device supported by said tilting frame, which sandpapering device comprises two rubbing-blocks; means for reciprocating said rubbing-blocks in contrary directions with relation to each other; and means for oscillating said tilting frame to move the sandpapering device bodily forward and backward.

25. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; an arm pivotally connected with said tilting frame; a sandpapering device supported by said arm, said sandpapering device comprising two rubbing-blocks; means for reciprocating said rubbing-blocks in contrary directions with relation to each other; a shaft having a screw-thread connection with said tilting frame; and means for rotating said shaft in opposite directions to oscillate said tilting frame and move said sandpapering device bodily forward and backward.

26. In a sandpapering-machine, in combination, a supporting-frame; a work-table thereon; a tilting frame pivotally mounted with relation to said supporting-frame; an arm pivotally connected with said tilting frame; a sandpapering device supported by said arm, which sandpapering device comprises two rubbing-blocks; means for reciprocating said rubbing-blocks in contrary directions with relation to each other; and a shaft having a screw-thread engagement with said tilting frame, which shaft is adapted to be rotated in opposite directions to oscillate said tilting frame and move said sandpapering device forward and backward over said work-table.

27. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; an arm pivotally connected with said tilting frame; a sandpapering device supported by said arm, which sandpapering device comprises two rubbing-blocks; a shaft at the pivotal connection between the tilting frame and the arm pivotally mounted thereon; two eccentrics fixed on said shaft; eccentric-rods for connecting said eccentrics with said rubbing-blocks; a shaft having a screw-thread engagement with said tilting frame, which shaft is adapted to be rotated in opposite directions to oscillate said tilting frame and move said sandpapering device forward and backward over said supporting-frame.

28. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; an arm pivotally connected with said tilting frame; a sandpapering device comprising two rubbing-blocks and a guide for each of said rubbing-blocks; a two-part shaft for pivotally connecting said sandpapering device to the free end of said pivoted arm; a weighted lever for counterbalancing the sandpapering device; a shaft mounted in the supporting-frame, having a screw-thread connection with said tilting frame; and means for rotating said shaft in opposite directions to oscillate said tilting frame and move the sandpapering device bodily forward and backward.

29. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; an arm pivotally connected with said tilting frame; a sandpapering device supported by said arm, said sandpapering device comprising two rubbing-blocks and a guide-rod for each of said rubbing-blocks; a two-part shaft for pivotally connecting said sandpapering device to the free end of said pivoted arm; a shaft at the pivotal connection between the tilting frame and the arm pivotally mounted thereon; two oppositely-extending eccentrics fixed on said shaft; eccentric-rods connecting said eccentrics with said rubbing-blocks; a shaft mounted in the supporting-frame and having a screw-thread connection with said tilting frame; and a crossed belt and a straight belt adapted to rotate said shaft in opposite directions to oscillate said tilting frame and move the sandpapering device bodily forward and backward.

30. In a sandpapering-machine, in combination, a supporting-frame; a sandpapering device comprising a yoke, two guide-rods fixed in said yoke, and rubbing-blocks slidably mounted upon each of said guide-rods, the adjacent edges of said rubbing-blocks being formed at an angle with their line of movement, straps at the sides of each of said blocks for securing sandpaper upon the blocks, and rods for connecting said straps together at the ends of the latter; two eccentrics; an eccentric-rod extending between each of said eccentrics and one of said rubbing-blocks; a tilting frame for supporting the sandpapering device; means for rotating said eccentrics; and means for oscillating said tilting frame.

31. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; an arm having a pivotal connection with said tilting frame; a sandpapering device supported by said arm; a weighted lever for counterbalancing the sandpapering device; a flexible connection extending between said pivoted arm and said weighted lever; a shaft mounted in said supporting-frame, having a screw-thread connection with said tilting frame; a straight and a crossed belt for rotating said shaft alternately in opposite directions; a shifting device for said belts; means on the tilting frame for operating said shifting device to change the rotative direction of said shaft; and means for actuating said sandpapering device.

32. In a sandpapering-machine, in combination, a supporting-frame; a tilting frame pivotally mounted with relation to said supporting-frame; an arm having a pivotal con-

nection with said tilting frame; a sandpapering device supported by said arm, which sandpapering device comprises two rubbing-blocks adapted to be reciprocated in opposite directions and a guide for each of said rubbing-blocks; two oppositely-extending eccentrics for reciprocating said rubbing-blocks; an eccentric-rod connecting each of said eccentrics with one of said rubbing-blocks; a shaft rotatably mounted in said supporting-frame and having a screw-thread connection with said tilting frame; a straight and a crossed belt for rotating said shaft in contrary directions; a shifting device for said belts, the rod for operating said shifting device extending through a stud upon said tilting frame; and adjustable stops mounted on said rod and adapted to be engaged by said stud.

JOHN A. HALLDEN.

Witnesses:
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GEO. L. CHINDAHL.