W. E. HOUGHLAND.

BRONZING MACHINE.

APPLICATION FILED MAR. 21, 1907.

944,192.

Patented Dec. 21, 1909.

7 SHEETS—SHEET 1.

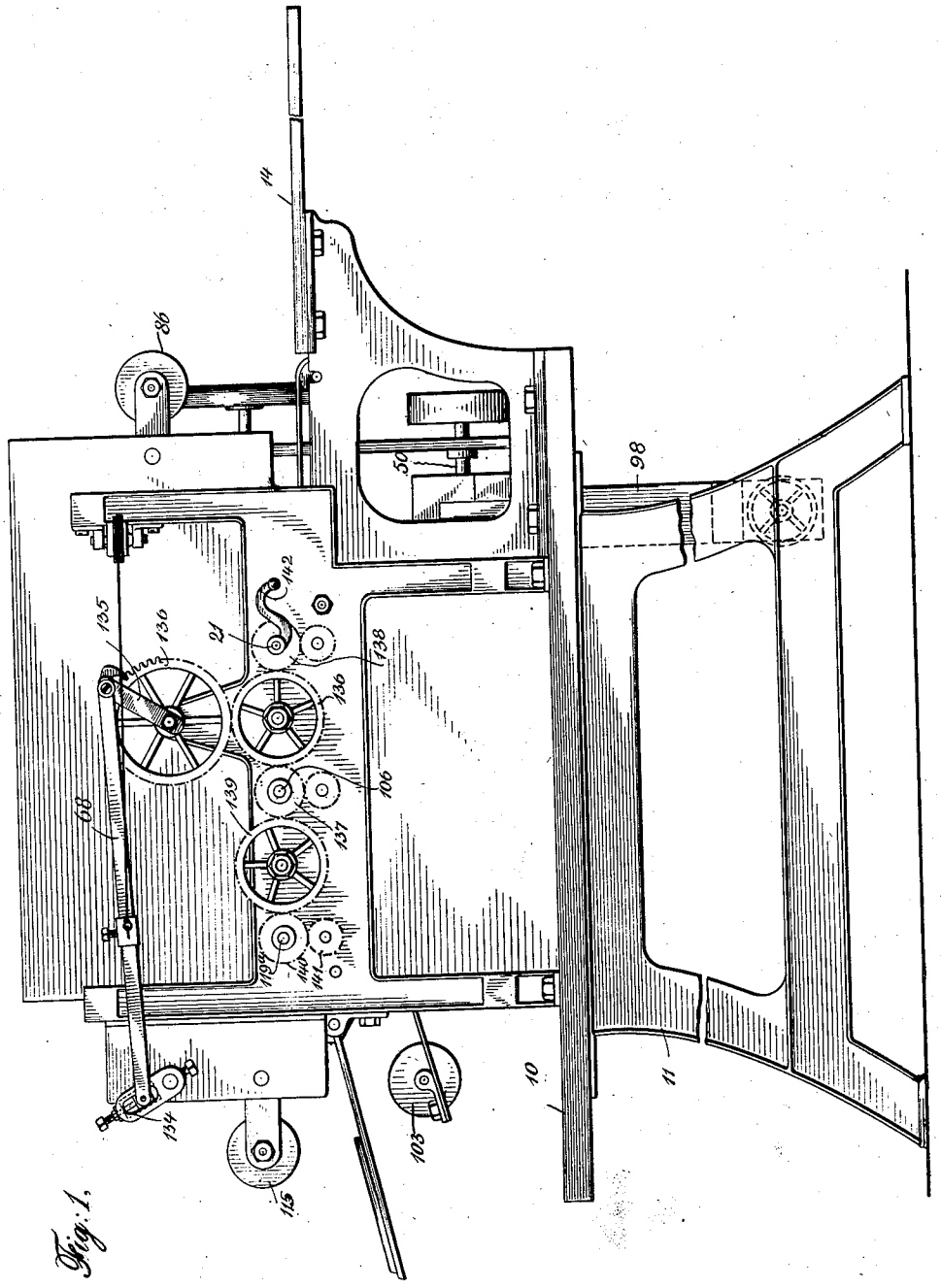

Fig. 1.

Witnesses
Max B. A. Doring
Lillie Cass

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By his Attorneys
Prindle and Williamson.

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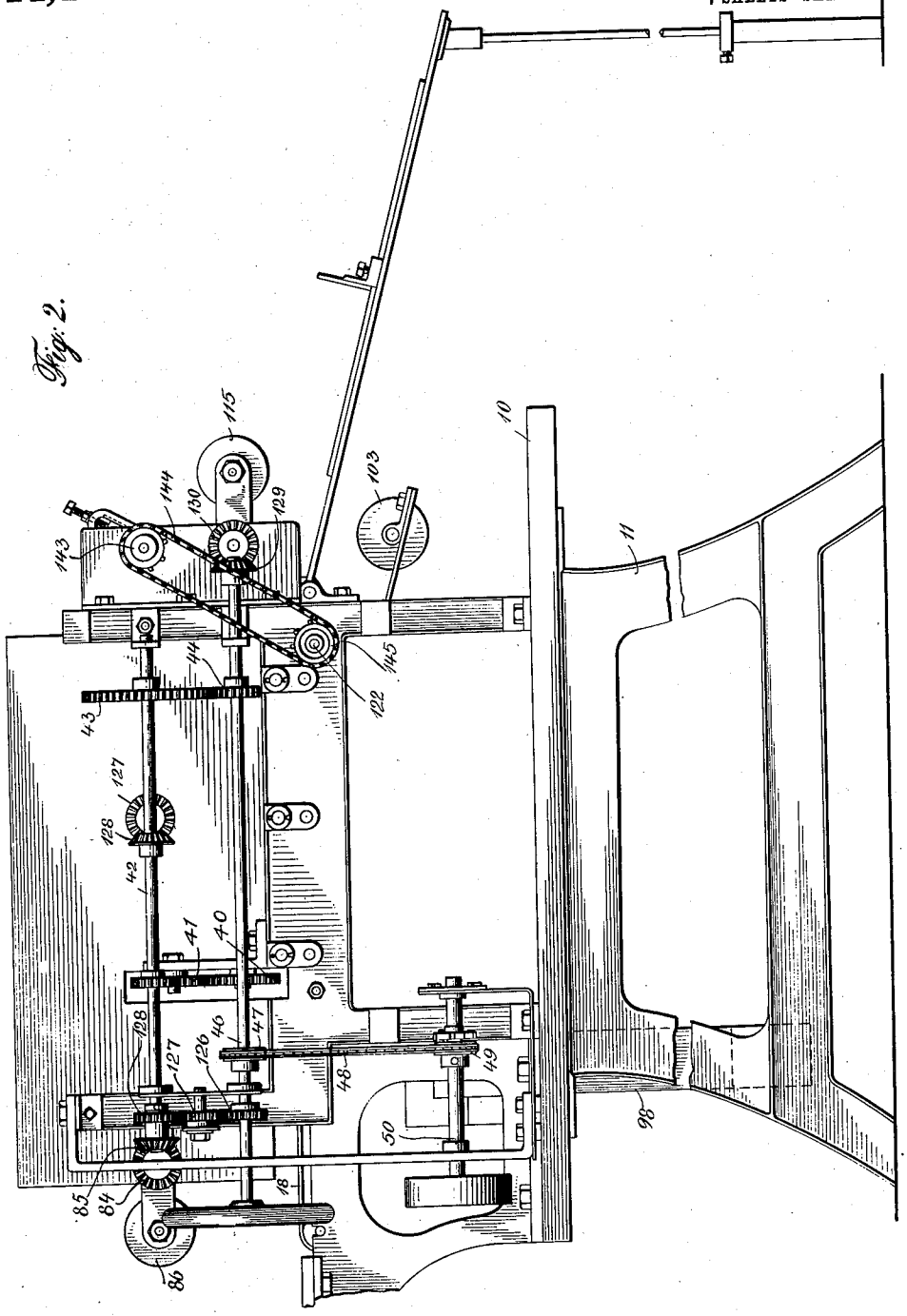
Fig. 2.



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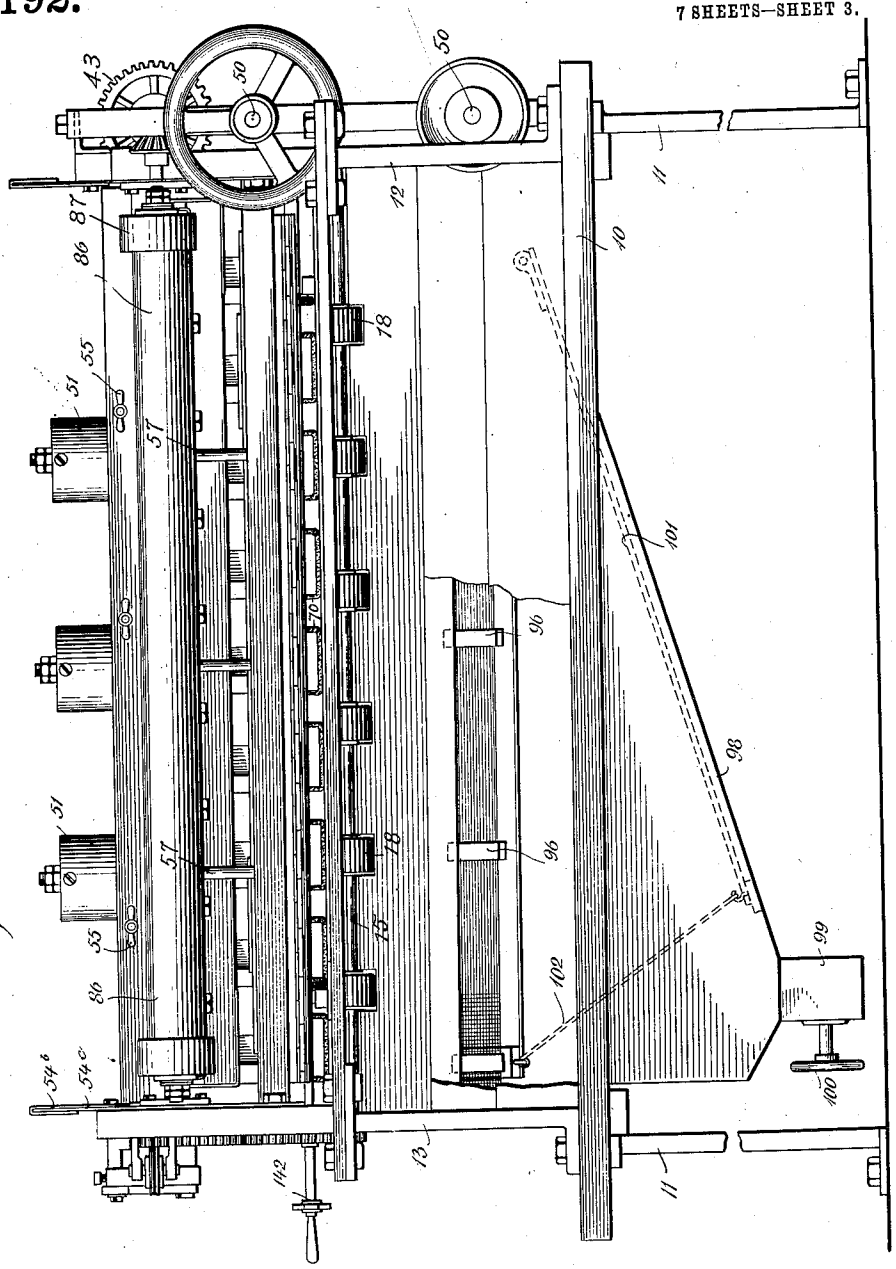

Fig. 3.

Witnesses
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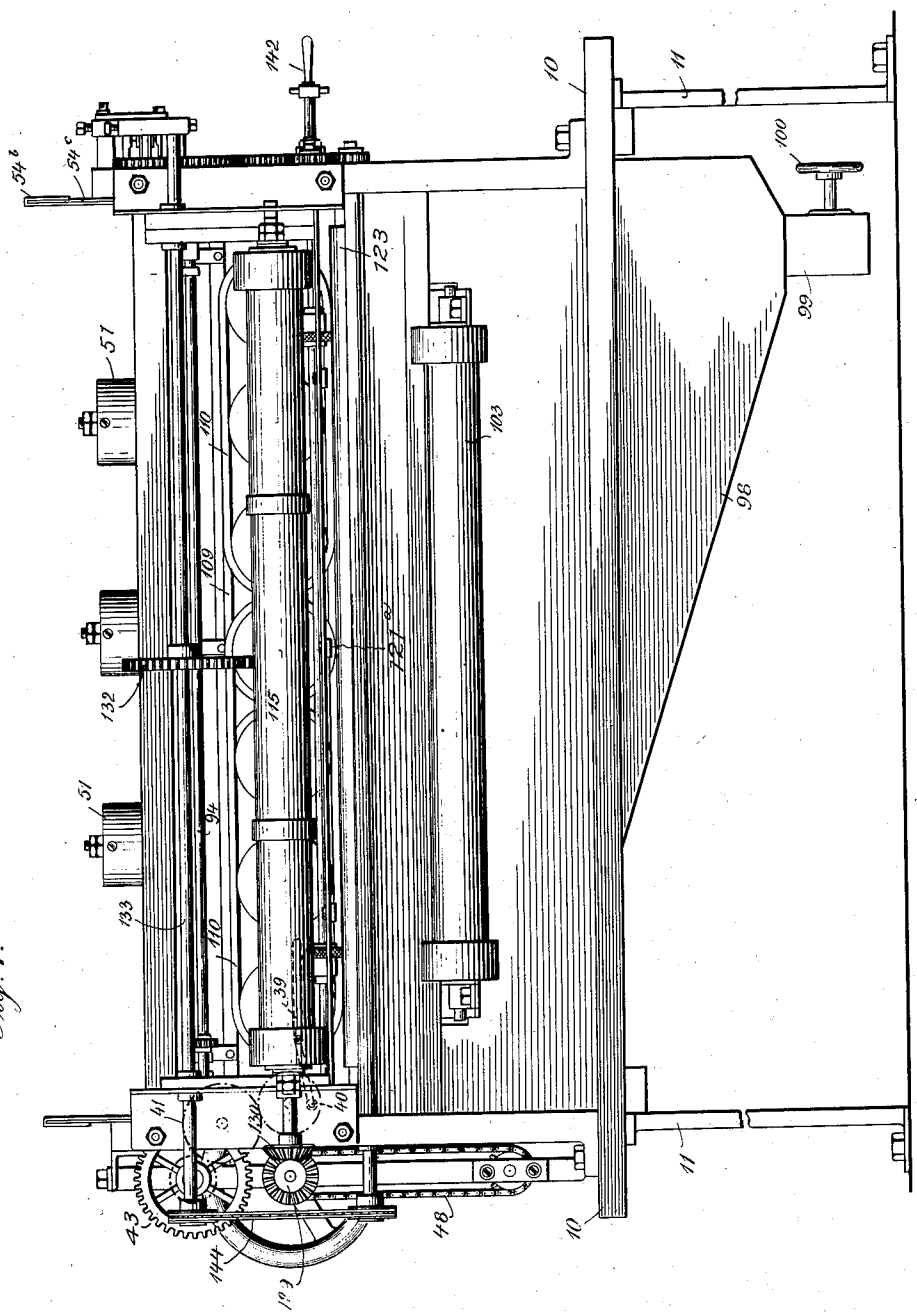

Fig. 4.

Witnesses
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7 SHEETS—SHEET 5.

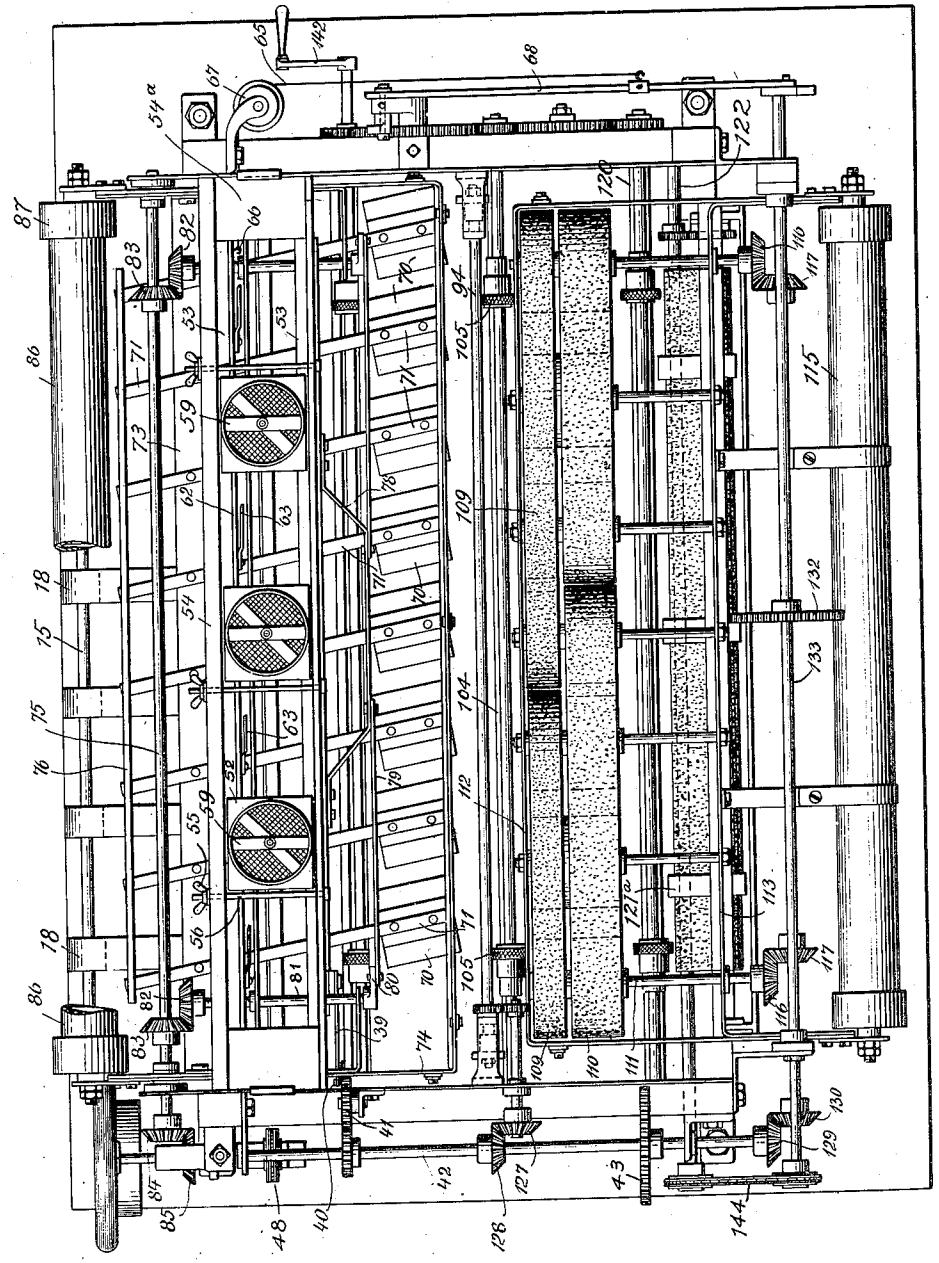

Fig. 5.

Witnesses
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7 SHEETS—SHEET 6.

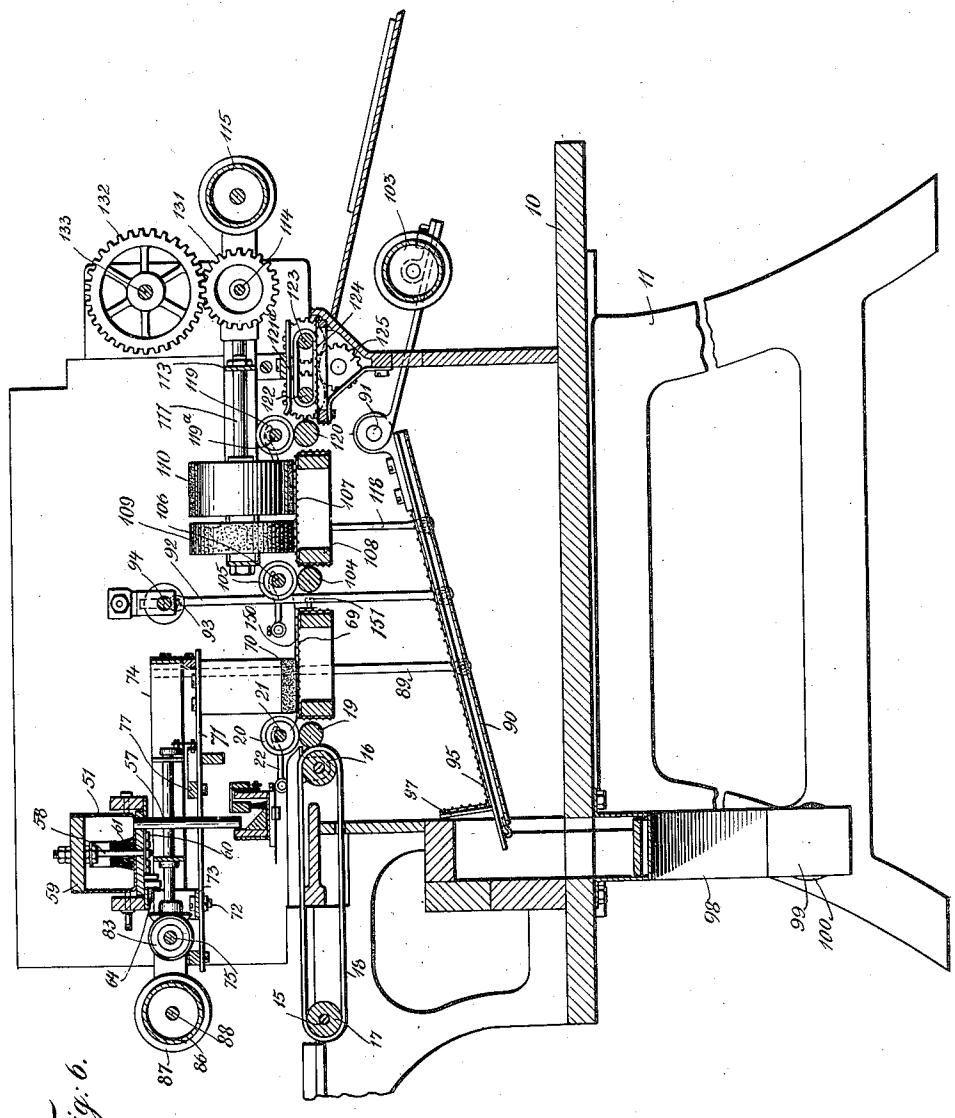

Fig. 6.

Witnesses
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7 SHEETS—SHEET 7.

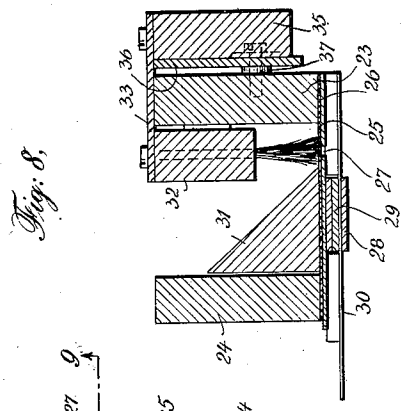

Fig. 8.

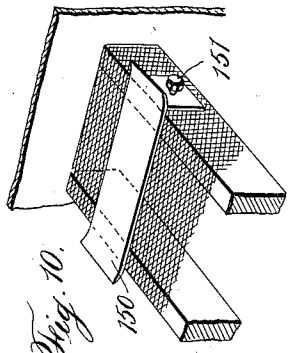

Fig. 10.

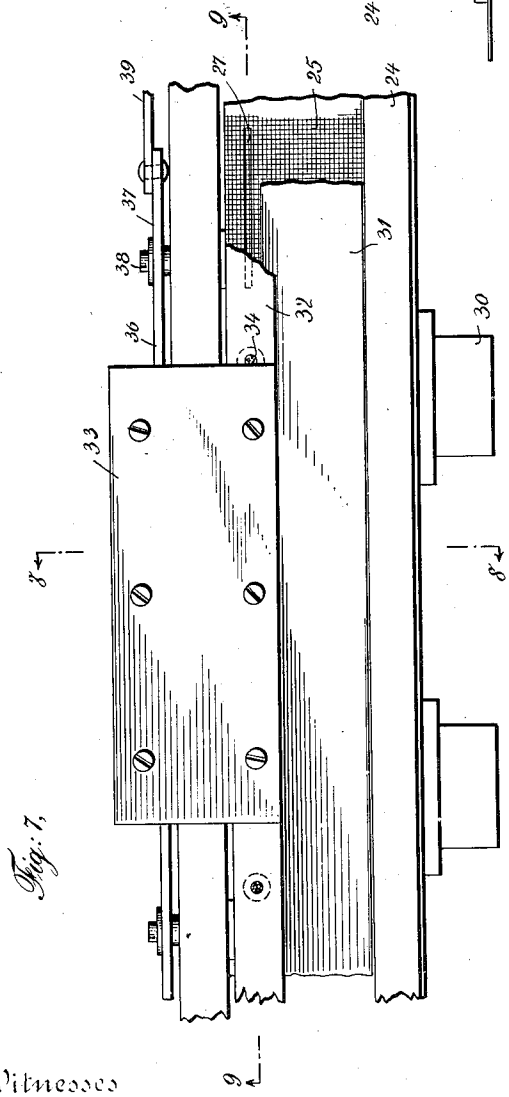

Fig. 7.

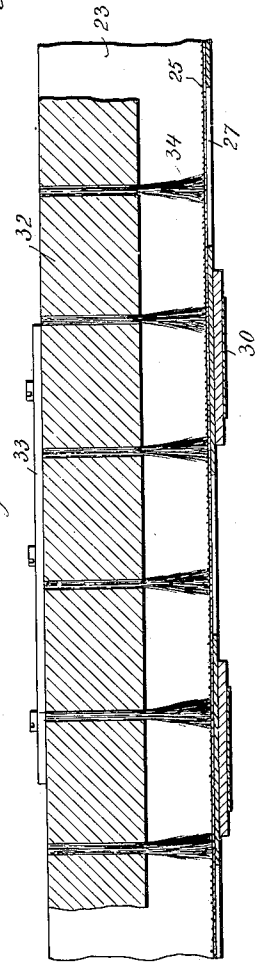

Fig. 9.

Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM E. HOUGHLAND, OF BROOKLYN, NEW YORK.

BRONZING-MACHINE.

944,192. Specification of Letters Patent. Patented Dec. 21, 1909.

Application filed March 21, 1907. Serial No. 363,733.

To all whom it may concern:

Be it known that I, WILLIAM E. HOUGHLAND, of Brooklyn, in the county of Kings, and in the State of New York, have invented a certain new and useful Improvement in Bronzing-Machines, and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a left side elevation of a machine embodying my invention; Fig. 2 is a right side elevation of Fig. 1; Figs. 3 and 4 are respectively front and rear elevations; Fig. 5 is a top plan view; Fig. 6 is a vertical cross sectional view; Fig. 7 is a top plan view of a portion of a magazine, and Figs. 8 and 9 are sectional views taken on the lines 8—8 and 9—9 of Fig. 7, and Fig. 10 is a fragmentary perspective view showing one of the plates for extending over the side edges of the paper to prevent the brushes from catching on such edges.

The object of my invention has been to provide an efficient machine for automatically applying bronze powder, or other similar powder, to paper, cloth, or any other material which has been previously coated partially or wholly, or which has been previously printed upon with an adhesive ink or size, and for dusting and polishing said paper. And to such ends my invention consists in the bronzing machine hereinafter specified.

In carrying my invention into practice, I provide a table 10 that may be supported by leg-frames 11. On the upper surface of the table are bolted end-frames 12 and 13 respectively, to which most of the operative parts of the machine are secured.

The machine is designed to bronze paper in a flat position. At the front of the machine is a table 14 upon which the paper to be bronzed is placed. A shaft 15 is journaled in the supports of the table 14, and a shaft 16 is journaled in the end-frames of the machine, each of such shafts having pulleys 17 mounted thereon, over which run feed-belts 18, that are adapted to carry the paper into the machine. The said belts are driven by being compressed between the pulleys 17 and a roller 19, that is also journaled in the end-frames of the machine. The paper is held down upon the roller 19 by rollers 20 on a shaft 21, said shaft being pressed down by spring-arms 22. The shaft 21 and the shaft of the roller 19 are geared together, and the teeth are of sufficient depth so that the rising and falling of the rollers 20 will not wholly disengage said gears.

Above the belts 18 is a lower magazine consisting of a front-wall 23, and a rear-wall 24, and a bottom consisting of a wire-mesh 25, beneath which is a sheet of metal 26 having slots 27 formed at intervals. Beneath the bottom of the hopper are secured cleats 28 and 29 that between them hold slides 30, which can be drawn back to permit bronze to fall from the slots 27, or which can be forced forward to the position shown in Fig. 8, in which bronze will be prevented from falling. Within the lower magazine is a block 31 having an inclined front-face that forces the bronze over the slots 27. Within the lower hopper is a bar 32 that is supported as by a plate 33, sliding on the wall 23 of the lower hopper. Brushes 34 are secured in the bar 32 and extend down to the wire-mesh. A bar 35 is secured to the plate 33 outside the lower hopper, said bar being provided with a plate 36 having slots in which are mounted rollers 37 that are secured to the wall of the hopper by screws 38, so as to form guides for the bar 35. The plate 36 is reciprocated by a connecting-rod 39, which, (see Fig. 5) is attached to a crank-pin 40 on a gear 41 that meshes with a pinion on a shaft 42, the latter being provided with a gear 43 meshing with a gear 44 on a shaft 46. The shaft 46 has a sprocket-wheel 47 that is connected by a chain 48 with a sprocket-wheel 49 on the driving-shaft 50.

Bronze is supplied to the lower hopper from upper hoppers consisting of cylindrical receptacles 51 mounted upon rectangular bases 52 that are adapted to rest upon flanges 53, which latter are secured to the under-sides of bars 54. The bars 54 are connected at their ends by plates 54^a, which are supported by sheet-metal hooks 54^b, that hook over and are supported upon plates 54^c secured to the end-frames. The receptacles 51 are removable and they may be secured in place by turning up thumb-nuts 55 on bolts 56 extending through the bars 54, thus springing said bars together, and clamping the bases of the receptacles. Each receptacle 51 has a pipe 57 extending down and into the lower hopper. Each receptacle 51 has a vertical shaft 58 that is journaled in the base 52, and in a bar 59 secured across the upper end of the receptacle. Each shaft 58 has a ratchet-wheel 60 on its lower end,

beneath the base 52. Within each receptacle 51 the shaft 58 carries a brush 61. In order to rotate the brushes a bar 62 is slidably mounted in the frame and is provided with spring-fingers or pawls 63 that are adapted to engage the ratchet-wheels on a right-hand stroke, as seen in Fig. 5, and to spring past such wheels on the return stroke. The bar 54 is drawn to the left, as seen in Fig. 5, by a spring 64 (Fig. 6), and it is drawn to the right, as seen in Fig. 5, by a cord 65 secured to a hook 66 on the bar, and passing around a pulley 67. The cord 65 is secured to a connecting-rod 68, to be later described. Any desired number of receptacles 51 can be used at a given time.

After having received bronze from the lower magazine, the paper passes over a fixed wire-mesh 69, which supports the paper beneath pads 70 that are adapted to rub the bronze evenly over the paper. Each pad 70 is supported on a lever 71 that is pivoted at 72 on the under-side of a bar 73, the latter being secured to the side-bars 74 of an oscillating frame, said frame being pivoted on a shaft 75 mounted in the end-frames of the machine. The rear ends of the lever 71 are pivoted to a bar 76, to insure that said levers shall move in unison. At a point between the pivot 72 and the brushes, the levers are pivoted to a bar 77, which has a bracket 78, to which are pivoted connecting-rods 79, each of said rods being pivoted to a crank-pin 80 on a shaft 81 that is journaled on the pivoted frame before referred to. The shafts 81 have bevel gears 82 which mesh with bevel gears 83 on the shaft 75. The latter shaft has a bevel gear 84 that meshes with a similar gear 85 loose on the shaft 42 before mentioned. The side-bars 74 of the pivoted frame carry at their rear ends a counter-weight which may be conveniently formed of a pipe 86 mounted on heads 87 on a rod 88 that is secured in the said side-bars. In order to prevent the pads 70 from catching on the side edges of the paper, the paper is protected by plates 150 that are adjustably secured to the bars supporting the netting 69 by a thumb screw 151, which engages a flange or blade depending from the plate 150, the screw passing through a horizontal slot. There are two plates 150, one for each of the side edges of the paper. This construction enables the plates 150 to be adjusted to suit the width of the paper being worked upon. The frame of the side-bars 74, and with it the pads 70, is raised away from the paper whenever the paper is fed. In order to raise such frame, the said side-bars are connected by a connecting-rod 89 with an apron 90 pivoted on a shaft 91 secured in the end-frames, and the said apron is oscillated on the shaft 91 by a connecting-rod 92, connecting the apron with a crank-pin 93 on a shaft 94 mounted in the end-frames. The apron 90 has a wire-mesh 95 that is supported above the apron by strips 96, so that the finer portions of the bronze falls through the said mesh and onto the apron, while the larger particles are caught by the mesh, and fall down against a vertical portion 97 of the apron. The material that passes through the wire-mesh 95 drops off the end of the apron into a receptacle 98 having a bottom slanting down to a chute 99 that is closed by a valve having a handle 100. Within the receptacle 98 is a pivoted bottom 101, pivoted at its end remote from the chute, its end nearer the chute being connected by a rod 102 with the apron 90, so that said pivoted bottom is oscillated with the apron, and tends to feed the bronze into the chute 98. The apron 90 is provided with a counter-weight 103, similar to that of the side-bars 74.

Beyond the wire-mesh 69 the paper is fed between a lower shaft 104, similar to the shaft 19, and rollers 105, of an upper shaft 106, similar to the shaft 21. The paper next passes over a wire-mesh 107, supported on bars 108, extending between the end-frames of the machine. While the paper is supported on the wire-mesh 107, the excess bronze is brushed off by narrower and wider brush-belts 109 and 110, respectively, such belts being mounted on pulleys on shafts 111 that are journaled in cross-bars 112 and 113 respectively, of a frame which is pivoted on a shaft 114 mounted in the end-frames, the said pivoted frame having a counter-weight 115, similar to that of the frame of the side-bars 74. The end pulleys of the series over which the brush-belts run should be crowned to keep the belts in place, while the intermediate pulleys may be cylindrical. The right and left shafts 111 are each provided with bevel gears 116 that mesh with bevel gears 117 on the shaft 114, the gears being so arranged that the under-surfaces of the belts travel from the center of the paper toward the side edges thereof, thus avoiding any tendency to catch on the side edges, and muss the paper. The parting between the two belts 109 occurs between a different pair of the pulleys from that of the two belts 110, and thus the portion of the paper not brushed at the parting of the belts 109 is brushed by the left hand belt 110, and the portion that would not be brushed at the parting of the belts 110, is brushed by the right hand belt 109. The belts 110 are wider than the belts 109, so that for any feed less than the width of the belts 110, the portion of the paper between the belts 109 and the belts 110, and, therefore, unbrushed, will, upon the next feed, be brushed by the belts 110. The frame 112 is oscillated to raise the belts off the paper at each feed by connecting-rods 118, connecting the side-bars of the said frame with an apron 90. The

paper, after passing beneath the brushing-belts, is fed along by pulleys 119 and a shaft 120, similar to the said pulleys and shaft before referred to, and it passes over a belt 121 that runs over shafts 122 and 123 extending between the side-frames, continuously and at the same speed as the feed, and the latter belt serves to brush off the bronze from the under-side of the paper, the belt itself being cleaned by running over a wire-mesh 124, supported by the frame. The shafts 122 and 123 each carry a gear meshing with an idler 125, so that the two shafts will turn in the same direction. Fixed guide-plates 121[a] serve to hold the paper down on the belt 121.

Motion is transmitted to the parts not already described as follows: As before stated, the driving shaft transmits motion to the shaft 46 by the chain and sprocket gearing. The shaft 46 has a gear 126 meshing with an idler 127 that drives a gear 128 which is movable on the shaft 42. The latter gear is connected with the bevel gear 84 before mentioned. The shaft 46 has a bevel gear 129 meshing with a similar gear 130 on the shaft 114 before mentioned. The shaft 114 carries a pinion 131 meshing with a gear 132 on a shaft 133, the latter shaft having on its end a crank 134, whose crank-pin is adjustable in a slot in said crank, to vary the throw of the crank-pin. The connecting-rod 68, before mentioned, is connected with said crank-pin. The opposite end of the said connecting-rod oscillates a pawl-lever 135, the pawl of which engages a gear 136 from which the feed is driven. The gear 136 meshes with gears 137 and 138 that are respectively on the shafts 106 and 21, carrying feed-rollers before mentioned. The shafts 104 and 19 have pinions that respectively mesh with the gears 137 and 138. Motion is transmitted from the gear 137 by an idler 139 to a gear 140 on the shaft 119[a] of the said rollers 119. The shaft 120 has a pinion 141 meshing with the gear 140. A crank 142 is secured on the shaft 21, so that, upon releasing the pawl, the feed mechanism can be worked by hand. The shaft 133 has a sprocket 143, which, through a chain 144, turns a sprocket 145 on the shaft 122, before described.

In the operation of my machine, the paper is first printed on or coated partially or fully with an adhesive ink or "size". The feed-rollers 20, 105 and 119, which are rubber and are adjustably secured to their shafts as by set-screws, are adjusted, so that they will engage the edges of the paper, but will not engage the paper where the bronze is to be applied. These rollers can be readily gotten at by disengaging the connecting-rods from the pivoted frames, and raising such frames entirely out of the way. This ability to raise the frames out of the way is also a great advantage in cleaning the machine. The paper is then laid on the belts 18 and engaged with the first feed-rollers. The machine is set in motion, causing the brushes 61 to rotate in the cups 51, and to brush some of the bronze or other powder into the tubes 57, from whence it flows into the lower magazine. In the lower magazine the bronze is brushed back and forth over the wire mesh by the brushes 34, and sifts through such mesh at the slots 27, falling upon the paper in a shower, which causes the bronze to be well scattered over the paper. The reciprocation of the connecting-rods cause the feed-rollers to be rotated a step, and moves the paper forward under the pads 70. At the time of the said movement, the pivoted frame carrying the pads 70 is raised so that the said pads do not catch the front edge of the paper. These pads rub the bronze thoroughly and evenly into the sizing, and thus cause a design to appear upon the paper in bronze, corresponding to what has been printed upon it in "size". These operations continue until the paper has arrived under the brushing-belts 109 and 110. These belts take off all loose bronze which has fallen where there is no sizing, or which has not adhered to the sizing, the excess thus removed and the bronze scattered by the brushes 70 falling upon the apron 90 and being carried into the receptacle 98. As before described, the belts 109 and 110 brush from the center of the paper outward, so that they run over the edge of the paper, instead of on to it, and thus they avoid catching and mussing the paper. It has also before been explained how the width of the brushing-belts is so proportioned to the feed motion, that the portion of the paper not brushed because it stops between the belts 109 and 110, is brushed at the end of the next step. During the feed motion, the brush-belts are raised out of the way, so that the front edge of the paper does not catch under them. After reaching the brush-belts, the paper passes under the guide plates 121[a], and the belt 121 cleans the under-side of the paper of bronze when the paper is stationary. When there is no paper in the machine, the pads 70 clean themselves on the wire fabric 69; the brush-belts 109 and 110 clean themselves on the wire fabric 107, and the belt 121 cleans itself on the wire fabric 124. By regulating the length of the feed step, as many applications of the pads or brush-belts as may be desired can be given to the said surface.

Adjustable plates may be provided to protect the side-edges of the paper, where the pads 70 sweep back and forth, so that such edges will not be caught by said brushes.

The machine above described illustrates that embodiment of my invention which I

consider best, but I am aware that the principles of the invention can be embodied in different forms, and I desire not to be limited beyond the requirements of the prior art, and the necessary intendment of my claims.

By the term "bronzing machine" as used in the claims, I mean to include any machine for applying any kind of powder to a flat surface, such as that of paper.

Having thus described my invention, I claim—

1. In a bronzing machine, the combination of means for feeding the paper, means for depositing powder on the paper, means for rubbing said powder over the paper, and means for raising said rubbing means during the feeding operation.

2. In a bronzing machine, the combination of means for depositing the powder on the paper, reciprocating means for rubbing it into the paper, and means for brushing off the excess of powder.

3. In a bronzing machine, the combination of a feeding mechanism for the paper, means for depositing powder upon the paper, means for rubbing it into the paper, means for removing the excess of powder, said means for rubbing and means for removing being both lifted from the paper during the feeding operation.

4. In a bronzing machine, the combination of feeding mechanism for the paper, powder depositing mechanism, laterally movable pads for rubbing in the powder, and plates projecting over the edges of the paper beneath said pads, to protect said edges.

5. In a bronzing machine, the combination of feeding mechanism for the paper, powder depositing mechanism, laterally movable pads for rubbing in the powder, plates projecting over the edges of the paper beneath said pads to protect said edges, and means for removing the excess of powder.

6. In a bronzing machine, the combination of means for feeding the paper, means for depositing powder on the paper, means for rubbing the powder into the paper, and means for removing the excess of powder, said last mentioned means comprising narrower belts and wider belts movable transverse to the feed, so that the portion of the paper between the belts at an earlier stage shall be beneath the wider belt at a later feed motion.

7. In a bronzing machine, the combination of means for feeding the paper, means for depositing powder on the paper, means for rubbing the powder into the paper, and means for removing the excess of powder, said last mentioned means comprising a narrower belt and a wider belt movable transverse to the feed, so that the portion of the paper between the belts at an earlier stage shall be beneath the wider belt at a later feed stage.

8. In a bronzing machine, the combination of means for feeding the paper, means for depositing powder on the paper, means for rubbing the powder into the paper, and means for removing the excess of powder, said last mentioned means comprising a narrower belt and a wider belt movable transverse to the feed, so that the portion of the paper between the belts at an earlier stage shall be beneath the wider belt at a later feed stage, said belts engaging the paper only during movements toward the adjacent edge of the paper.

9. In a bronzing machine, the combination of means for feeding the paper, means for depositing powder on the paper, means for rubbing the powder into the paper, and means for removing the excess of powder, said last mentioned means comprising a narrower belt and a wider belt movable transverse to the feed, so that the portion of the paper between the belts at an earlier stage shall be beneath the wider belt at a later feed stage, the stretches of said belts which touch the paper being movable only from the center of the paper toward an edge of the paper.

10. In a bronzing machine, the combination of a feed mechanism comprising lower rolers, upper rollers, laterally adjustable means for depositing powder, and means for rubbing the powder into the paper.

11. In a bronzing machine, the combination of means for feeding the paper, means for depositing powder upon the paper, pads for rubbing the powder into the paper, and a wire netting beneath said pads, and against which said pads are adapted to rub, when paper is not in the machine.

12. In a bronzing machine, the combination of means for feeding the paper, means for depositing powder on the paper, means for rubbing it in, brushes for removing the excess of powder, and wire netting against which said brushes are adapted to rub, when paper is not in the machine.

13. In a bronzing machine, the combination of means for feeding the paper, a trough above the path of the paper having openings in its bottom, that are covered by a wire cloth, and brushes vibrating over said wire cloth.

14. In a bronzing machine, the combination of means for feeding the paper, a magazine transverse to the direction of feed, said magazine having a slotted bottom covered with wire cloth, brushes reciprocating over said slots, and slides adapted to close portions of said slots.

15. In a bronzing machine, the combination of a lower magazine extending the width of the machine, brushes therein adapted to

deposit powder on the paper from said magazine, and a series of cylindrical upper magazines having rotating brushes therein and each having a tube for conveying powder to a portion of said lower magazine, whereby the powder supplied to said lower magazine is substantially distributed throughout its length.

16. In a bronzing machine, the combination of means for feeding the paper, a magazine transverse to the direction of feed, said magazine having a series of slots in its bottom, means for closing said slots, and a series of removable upper magazines adapted to supply powder to the portions of said lower magazine where the slots are open.

17. In a bronzing machine, the combination of means for feeding the paper, a magazine transverse to the direction of feed, a brush in said magazine for depositing powder therefrom upon the paper, and a series of removable upper magazines adjustably secured to said lower magazine, whereby powder may be supplied to said lower magazine only over the printed portions of the paper.

18. In a bronzing machine, the combination of intermittently operative means for bronzing the upper side of the paper, intermittently operating means for feeding the paper, and a belt for cleaning the under side of the paper, said belt running continuously in the direction of and at the speed of the feed.

19. In a bronzing machine, the combination of means for depositing powder on the paper, means for rubbing said powder over the paper, and an adjustable feed, whereby the paper may be subjected for a longer or shorter time to the action of said means for rubbing.

20. In a bronzing machine, the combination of intermittently operative means for bronzing the upper side of the paper, intermittently operative means for feeding the paper, and means for cleaning the underside of the paper.

In testimony that I claim the foregoing I have hereunto set my hand this 15th day of March 1907.

WILLIAM E. HOUGHLAND.

Witnesses:

E. H. HAZELWOOD,

CHAS. S. OUGHELTREE.