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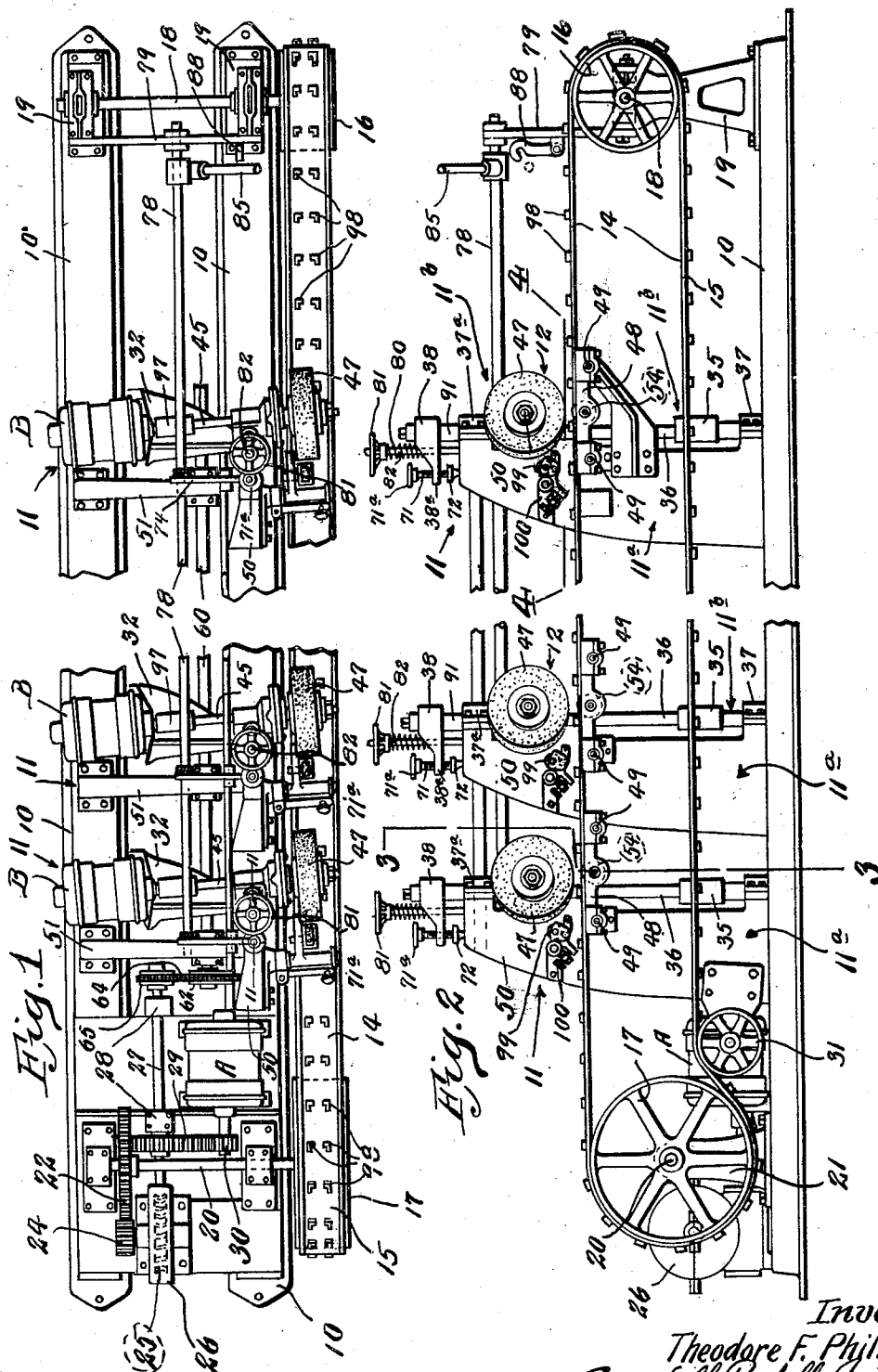
T. F. PHILIPPI

1,788,249

GRINDING AND POLISHING MACHINE

Filed June 24, 1926

7 Sheets-Sheet 1



Inventor
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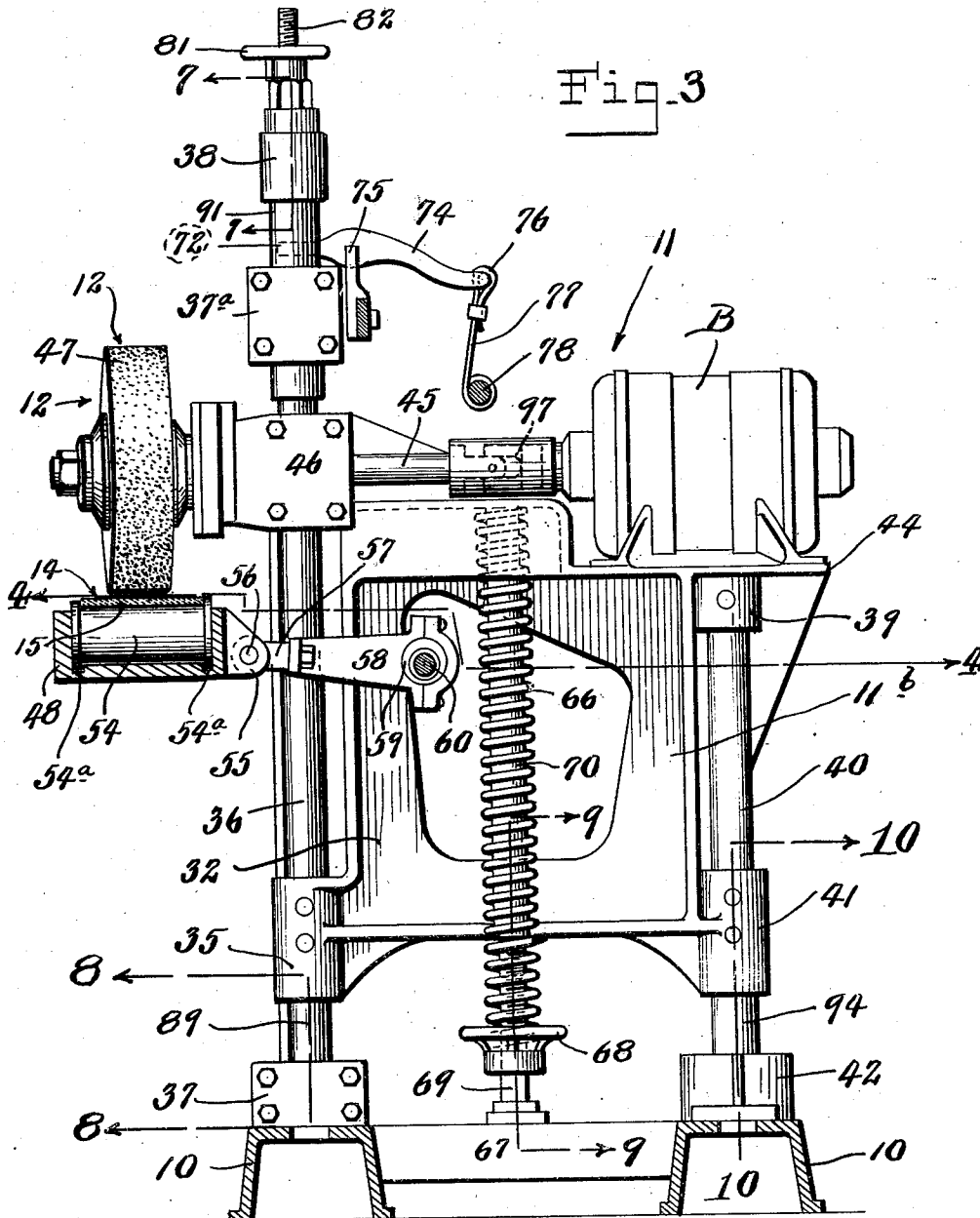
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GRINDING AND POLISHING MACHINE

Filed June 24, 1926

7 Sheets-Sheet 2



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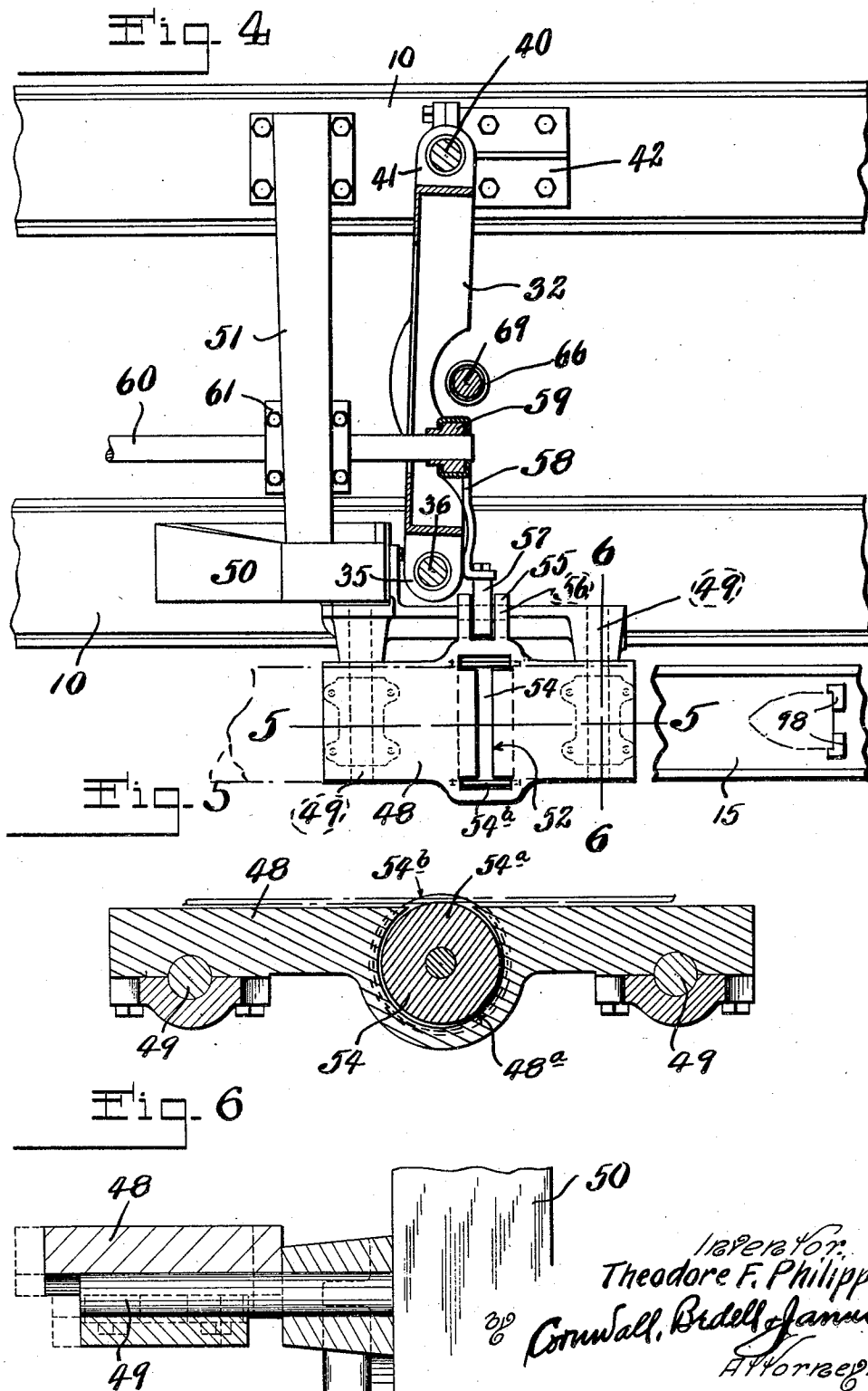
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GRINDING AND POLISHING MACHINE

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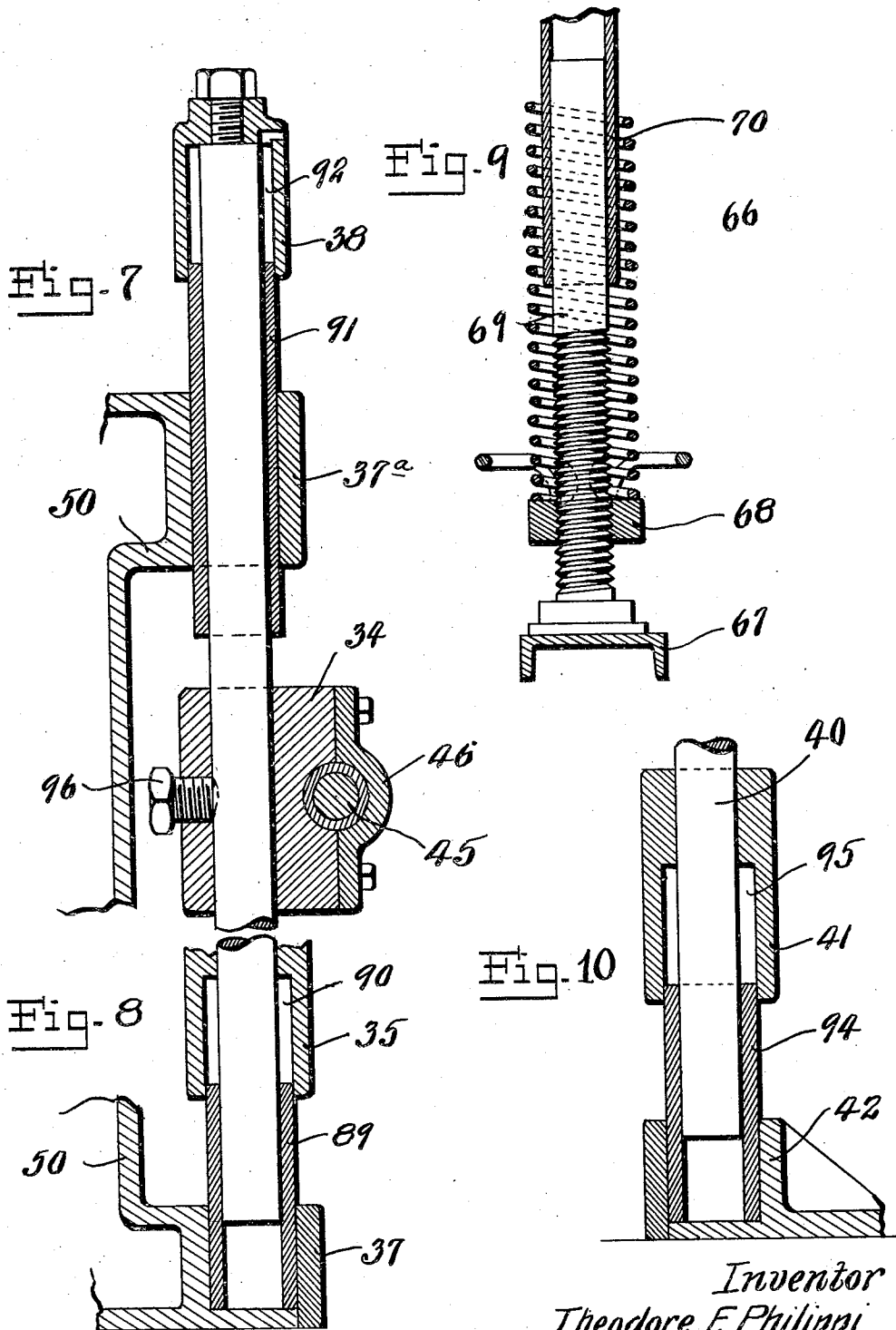
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GRINDING AND POLISHING MACHINE

Filed June 24, 1926

7 Sheets-Sheet 4



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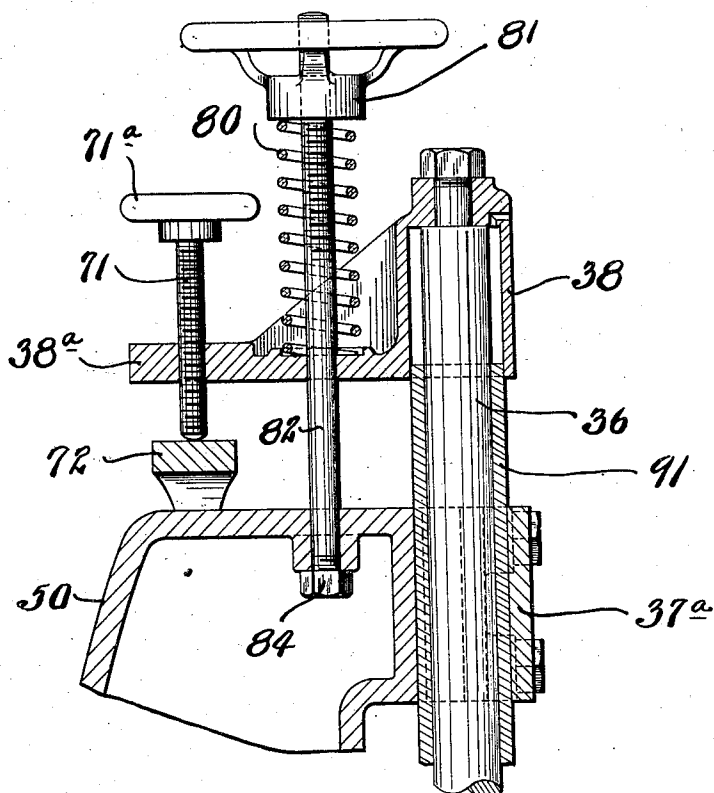
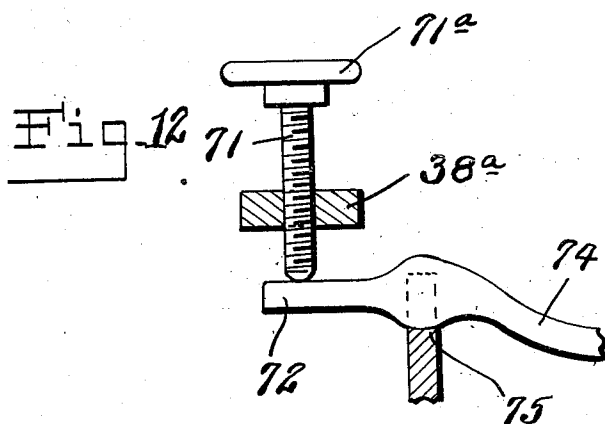
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GRINDING AND POLISHING MACHINE

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Fig. 11.



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1,788,249

GRINDING AND POLISHING MACHINE

Filed June 24, 1926

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Fig. 15

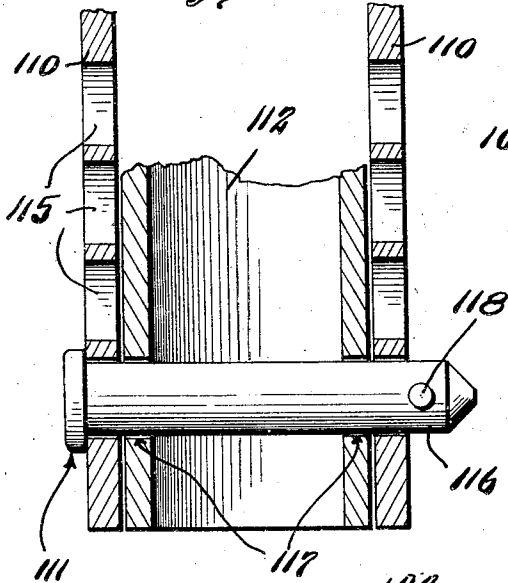


Fig. 16

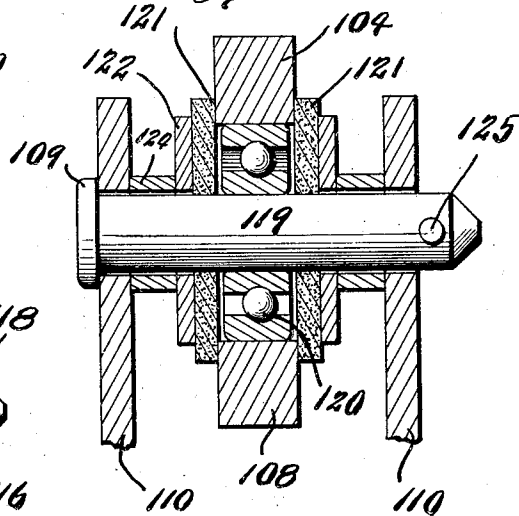
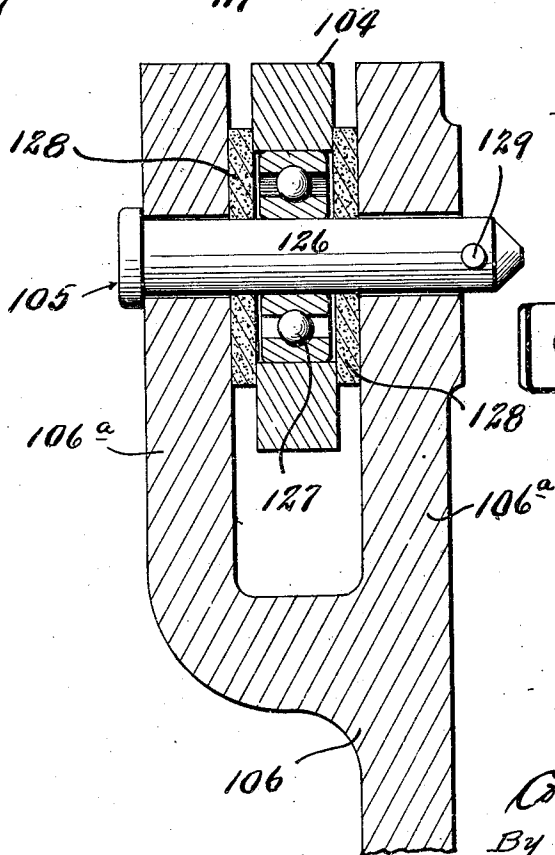


Fig. 17

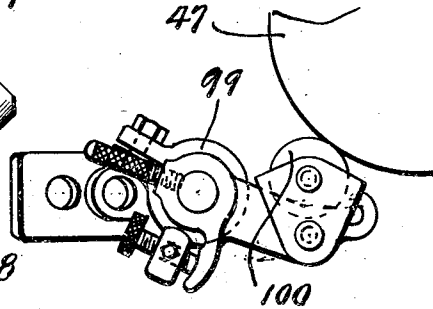


Fig. 18

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UNITED STATES PATENT OFFICE

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GRINDING AND POLISHING MACHINE

Application filed June 24, 1926. Serial No. 118,261.

This invention relates to new and useful improvement in grinding and polishing machines, the objects of the invention being to provide a machine wherein the work fed to the grinding and polishing means is simultaneously vibrated laterally to avoid straight line grinding or polishing effect on the finished surface of the work.

Further objects of the invention are to set the polishing or grinding wheels at an angle so that the line of rotation of the peripheral faces of said wheels are disposed at an angle to the line of travel of the work, thereby further insuring against straight line effect of the finished work.

Still further objects of the invention are to provide a multiple of the work engaging units and to provide a work carrier movable relative to said units to successively bring the work in operative engagement with each unit and to discharge said work after being operated upon by all of said units.

Other objects of the invention are to build said units so that they may be operated and adjusted independently of each other and may be arranged in series of any desired number to progressively operate upon the work fed thereto.

Further objects of the invention are to provide means for simultaneously moving all of said units out of operative engagement with the work and to retain said units in such disengaged positions.

Additional objects of the invention are to provide a machine of the class described having its various mechanism disposed to operate in cooperative relation with each other and provided with means for readily adjusting said machine in order to assure efficient operation and production.

With these and other objects in view, my invention consists in certain novel features of construction and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a top plan view of the machine partly broken away.

Figure 2 is a front elevational view partly broken away.

Figure 3 is a vertical transverse section taken on line 3—3 of Figure 2.

Figure 4 is a horizontal section taken on line 4—4 of Figure 3.

Figure 5 is a vertical section taken on line 5—5 of Figure 4.

Figure 6 is a vertical section taken on line 6—6 of Figure 4.

Figure 7 is a vertical cross section taken on line 7—7 of Figure 3.

Figure 8 is a vertical cross section taken on line 8—8 of Figure 3.

Figure 9 is a vertical cross section taken on line 9—9 of Figure 3.

Figure 10 is a vertical cross section taken on line 10—10 of Figure 3.

Figure 11 is a vertical cross section taken on line 11—11 of Figure 1.

Figure 12 is a detail view showing means for moving the tool out of operative engagement with the work.

Figure 13 is a vertical transverse section of the machine showing modified balancing means.

Figure 14 is a horizontal detail section taken on line 14—14 of Figure 13.

Figure 15 is a detail section taken on line 15—15 of Figure 13.

Figure 16 is a detail section taken on line 16—16 of Figure 13.

Figure 17 is a detail section taken on line 17—17 of Figure 13.

Figure 18 is a detail sectional view of the dresser wheel mounting.

The invention relates to a machine for grinding or polishing, or both, flat or substantially flat surfaces of pieces of work, such as the base plates of electric irons or other objects requiring ground or polished surfaces.

Referring by numerals to the accompanying drawings, 10 indicates a pair of longitudinally disposed bed frames or pieces on which are supported at suitable spaced intervals operating units 11. Each unit comprises a stationary or supporting section 11^a and a movable or adjustable section 11^b and the latter has a grinding or polishing member 12 which is disposed in cooperative relation with a work carrier 14 which latter is pref-

erably in the form of a belt or endless conveyor 15 operating over pulleys 16 and 17. Pulley 16 is mounted on a shaft 18 having bearings in supports 19 fixed to and disposed transversely to the forward ends of bed plates 10. Pulley 17 is fixed to a shaft 20 having bearings in supports 21 which are fixed to and project upwardly from the rear ends of bed pieces 10. Pulleys 16 and 17 are disposed to one side of bed pieces 10 so that belt 15 operates or passes immediately under the grinding or polishing members or wheels 12.

Shaft 20 is driven in any suitable manner, preferably by suitable reduction gearing which consists of a gear 22 fixed to shaft 20 and meshes with a pinion 24 of a worm gear drive 25 which is enclosed in a suitable housing 26. A shaft 27 extends from said housing 26 and is journaled in bearings 28. A gear 29 is fixed to said shaft and engages a pinion 30 which is carried by a shaft of a motor A. An idler pulley 31 is used to take the slack out of the belt.

Each operating unit comprises a vertically disposed web frame 32 forming part of movable section 11^b disposed transversely of the bed frames 10 and provided at its forward end with an upper bearing 34 and a lower bearing 35 for receiving a vertically disposed column 36, the lower end of which is supported in a box 37 carried by one of the bed plates 10 and the upper end of which carries a bracket 38. The rear end of frame 32 is provided with an integral bearing 39 which receives the upper end of a vertically disposed column 40 and said frame is provided with a lower bearing 41 receiving the lower portion of said column 40. The lower end of this column or post is disposed in a box 42 which is carried by the other one of said bed pieces 10.

A suitable shelf 44 is formed on the rear upper portion of frame 32 and supports a motor B which drives a shaft 45 extending forwardly and transversely of bed frames 10 and journaled in a bearing 46 carried by bearing 34. The forward end of said shaft 45 projects from bearing 46 and has mounted thereon in any suitable manner the grinding or polishing element 12 which, in the present instance, is in the form of a wheel 47 of suitable abrading material and is disposed immediately above the upper portion of belt or work carrier 14. Motor B and shaft 45 are arranged to have their axes inclined to one side of a line drawn at right angles to the line of travel of the belt 14. Thus the line of movement of the peripheral face of the wheel 47 is set at a slight angle to the line of travel of belt 14 and the work carried thereby, whereby the scratch lines produced on the work by said wheel will be inclined from the longitudinal axis of the work.

In order to eliminate the straight line effect on the surface of the work, belt 14 is vibrated laterally with respect to the grinding or polishing wheels 47. This vibration is effected by means of a table 48 which is disposed below belt 14 and is slidably mounted on rods 49 which are carried by and project laterally from a frame 50 forming part of fixed section 11^a which latter is supported on one of the bed pieces 10 and projects upwardly therefrom and has a portion 51 extending rearwardly and transversely thereof and is fixed to the other one of said bed pieces 10.

This table 48 is provided with a centrally disposed I-shape slot 52 through which project the upper portions of a flanged roller 54 which is revolvably mounted in a recess 48^a formed in said table 48. The peripheral face 54^a is engaged by belt 14 whereby said roller 54 forms anti-friction support for said belt while the flanged portions 54^a of said roller 54 engage the edges of said belt and form guides therefor.

Projecting horizontally and rearwardly from table 48 is a pair of lugs or ears 55 carrying a pin 56 which is loosely engaged by apertured end 57 of an arm 58. The rear end of this arm engages an eccentric 59 which latter is fixed to a shaft 60 which is disposed longitudinally of the machine and is supported in bearings 61 of frame portions 51. One end of this shaft 60 has fixed thereto a sprocket wheel 62 over which operates a sprocket chain 64 which is driven by a sprocket wheel 65, the latter being fixed to shaft 27. In this manner shaft 60 is rotated at predetermined speed, thereby actuating arms 58 through eccentrics 59 and causing said arms to vibrate laterally with respect to belt 14. The flanges 54^b of roller 54 engaging the edges of belt 14 cause the latter to move with said table 48, thereby imparting vibrating lateral motion to said belt and the work carried thereby.

Column 36 is loosely disposed in stationary bearings 37 and 37^a which form part of frame 50 and column 40 is loosely arranged in stationary bearing 42. In this manner columns 36 and 40 and frame 32 are adjustable in vertical plane so as to bring wheel 47 in proper operative relation with the work on belt 14. In order to counterbalance the weight of columns 36 and 40, frame 42, and parts supported thereby, a heavy coiled spring 66 is interposed between a stationary support, such as 67, and part of the movable section of the operating unit, in the present instance, frame 32. The upper end of this spring is seated in a sprocket formed in said frame and the lower end of said spring bears against a collar or hand wheel 68 which is screw-seated on the threaded member 69 resting on support 67. By turning wheel 68 in the proper direction, said wheel can be moved in

a vertical plane, thereby increasing or decreasing the tension of spring 66 and providing proper counterbalance for the movable parts of the operating unit, namely, frame 32 and parts supported thereby. Frame 32 and the mechanism carried thereby are adjusted in a vertical plane by means of a screw 71 (see Figures 2 and 11) which has threaded engagement with a horizontal extension 38^a of bracket 38 and has its lower end bearing on the forward end 72 of arm 74 which is pivotally supported at 75 and has its rear end 76 connected by a flexible connection 77 (see Figure 3) to a longitudinally disposed rock shaft 78, which latter extends the full length of the machine and has one end journaled in one of the sections 11^a and its opposite end in a bearing formed by cross arm 79, which latter is disposed near supports 19. The upper end of screw 71 is provided with a hand wheel 71^a by means of which said screw can be turned so as to move bracket 38 upwardly or downwardly as desired. Bracket 38 being fixed to the upper end of column 36, it is obvious that said column as well as frame 32 which is fixed thereto will be moved in a vertical plane, thereby lowering or raising wheel 47 relative to belt or work carrier 14.

In order to maintain wheels 47 in proper operative engagement with the work positioned on belt 14 it is desirable that said wheels be held in contact with the work under spring pressure. This spring pressure is supplied by a coiled spring 80 vertically disposed above the horizontal portion 38^a and having its lower end seated thereon. The upper end of this spring bears against a wheel 81 which is screw-seated on the threaded upper end of a rod 32 which passes through an aperture in said extension 38^a and has its lower end attached to a portion of frame 50 as indicated at 84 (see Figure 11). By turning wheel 81 in the proper direction, the tension of spring 80 can be increased or decreased as desired, thereby regulating the pressure with which the wheel 47 is applied to the work. Each operating unit 11 has its own counterbalancing means 66 and its own adjusting means 71 so that each operating unit can be adjusted independently of each other and each operating unit is provided with individual tension regulating means to control the operating pressure of the respective abrading wheel 47.

The operating wheels 47 of all of said units can be simultaneously moved out of engagement with the work by operating shaft 78 so as to actuate arms 74 and move the forward ends 72 thereof upwardly. The upward movement of wheels 72 causes the movable sections 11^b of each operating unit to be moved upwardly through the interengagement of screws 71 and brackets 38. The actuation of rock shaft 78 is accomplished by

a handle 85 which is fixed to said shaft and can be manually operated. When said handle is in depressed position it can be locked in this position by a hooked member 88 which is pivotally secured at its lower end to cross piece 79. By locking said handle in depressed position, the wheels of all of the units will be held in raised positions out of engagement with the work and belt 14.

In order to prevent dust, which is always present in operating grinding and polishing machines, from entering the bearings in which posts 36 and 40 operate, the stationery bearing 37 is provided with a sleeve 89 which extends upwardly therefrom and has its upper end slidably arranged in the enlarged bore 90 formed in bearing 35. The length of this sleeve and the length of recess 90 are such that when the movable section 11^b occupies its uppermost position, the upper end of sleeve 89 occupies a position in the lower end of bearing 35 so that said bearing is sealed at all times, thereby preventing dust from entering the same. Similarly, bearing 37^a is provided with a sleeve 91 which projects upwardly and has its upper end slidably arranged in an enlarged bore 92 formed in bearing 38 and the upper end of said sleeve occupies the lower end of bearing 38 when said movable section is moved to its uppermost position so that at no time is the upper portion of column 36 exposed to dust.

Stationary bearing 42 is provided with a sleeve 94, the upper end of which operates in an enlarged bore 95 of bearing 41 and protects said end of column 40 from dust. Bearing 46 of shaft 45 is adjustable in vertical plane on column 37 by means of a set screw 96 which locks said shaft in proper position on said column. Shaft 45 of motor B is preferably made in two sections and is provided with a flexible coupling 97 in order to eliminate binding in case the respective bearings are not in proper alignment.

The work to be ground or polished is placed on the horizontally disposed upper portion of belt 14 at one end of the machine and is fed forward by said belt by means of cleats or projections 98 which are disposed in position at spaced intervals on said belt and are adapted to engage the work and carry it forward near the work engaging wheels 47 and after being operated upon by all of the wheels the work is discharged from the belt at the opposite end of the machine where a plurality of wheels 47 is used. These wheels may be of different grades gradually increasing in fineness as the work progresses through the machine.

A suitable mounting 99 is supported on each frame 50 adjacent to each wheel 47 and is adjustable so as to bring a dresser wheel 100, carried by each mounting 99, in proper engagement with the periphery of the corresponding wheel 47, whereby the latter may

be maintained at all times in proper grinding condition.

Where the work to be operated upon has surfaces to be ground or polished disposed at different horizontal planes as, for instance, in case of automobile bumpers having their ends curved or offset inwardly, the supporting mechanism for wheel 47 has to have a greater amount of travel than where the machine is used for grinding straight surfaces or polishing base plates of electric irons or other similar objects. In such cases it is not desirable to use coiled springs 66 to counterbalance the vertical movable sections 11^b on account of the excessive pressure produced by the compression of springs 66.

A modified arrangement is shown in Figures 13 to 17 wherein the spring 66 is dispensed with and each movable section 11^b is counterbalanced by a suitable weight 101 which is adjustably mounted on the end of a long arm 102 of a lever 104. This lever is fulcrumed at 105 in a bracket 106 which is secured by suitable fastening devices 107 to a stationary support, such as frame 50. The inner or short arm 108 or lever 104 is pivotally connected at 109 to a pair of links 110 which extend downwardly from said lever and are connected at 111 to the opposite sides of the lower end of a tubular member 112. This member has its upper end screw-seated at 114 in the upper portion of movable frame 32 and supports the latter and the mechanism carried thereby in position. Thus the adjustable section 11^b is movable in vertical plane so as to move wheel 47 suitable distance relative to work carrying member 14 without changing the pressure exerted by the counterbalancing means and at the same time provide sensitive automatic adjustment of wheel 47 so that the latter will take care of any variations in horizontal plane of the work. Each link 110 is provided with a series of apertures 115 disposed substantially in vertical plane whereby the distance between pivotal points 109 and 111 can be increased or reduced as desired. The pivot 111 consists of a pin 116 which is seated in apertures 117 formed in tubular section 112 and is designed to engage anyone of said apertures 115. A cotter pin 118 locks pin 116 against accidental displacement. The pivotal connection 109 comprises a pin which is seated in the upper links 110 and engages a ball bearing 120 arranged in the outer arm 108 of lever 104. The use of ball bearing 120 reduces the friction and prolongs the life of the device. Ball bearing 120 is protected against dust by felt washers 121 arranged on each side of said ball bearing and held in position by washers 122, which are spaced from links 110 by spacers 124. A cotter pin 125 is used to lock pin 119 in position. The pivotal point 105 consists of a pin 126 which is seated in spaced ears 106^a and engages one end of lever

104. A ball bearing 127 is preferably used between pin 126 and lever 104 and a pair of felt washers 128 is interposed between lugs 106^a and 104 and form protective seals for said bearings. A cotter pin 129 or other suitable locking means is used to prevent displacement of pin 126. The use of ball bearings 120 and 127 is desirable in order to reduce friction at these points which would be considerable otherwise on account of the heavy mass of material involved in rendering the section 11^b movable in vertical plane for permitting automatic adjustment of the grinding or polishing element 12 with respect to the work operated upon.

A grinding and polishing machine of my improved construction is highly efficient in operation and can be arranged as a single unit having only one grinding and polishing element or combination of units for progressively operating upon the work and is arranged so as to prevent straight line grinding or polishing effects on the surface operated upon and is automatic in its action, requiring very little attention and can be easily controlled.

While I have shown and described the preferred form of my invention it is obvious that various changes can be made in the construction and arrangement of parts of my improved grinding and polishing machine without departing from the spirit of my invention.

I claim:

1. In a grinding and polishing machine, the combination of a stationary support, a plurality of vertically disposed tubular bearings carried in spaced-apart relation by said support, a pair of uprights slidably mounted in said bearings, a frame fixed to said uprights, means cooperating with said frame and said support for counterbalancing and yieldingly supporting said uprights and said frame and parts carried thereby in position, a horizontally disposed shaft revolvably carried by one of said uprights and said frame, a work engaging wheel fixed to the forward end of said shaft, an extension fixed to one of said uprights, a threaded rod fixed at its lower end to said support and extending through said extension, a collar adjustably seated on the upper end of said rod, a coiled spring interposed between said collar and said extension for exerting downward spring pressure against said upright and parts associated therewith, whereby said wheel is held in yielding engagement with the work, and a work support disposed under said wheel for bringing the work into engagement with the peripheral surface of said wheel.

2. In a grinding and polishing machine, the combination of a stationary support, a plurality of vertically disposed tubular bearings carried in spaced-apart relation by said support, a pair of uprights slidably mounted

in said bearings, a frame fixed to said up-
 rights, and provided with downwardly open-
 ing tubular extensions which enclose the up-
 per ends of said bearings, means cooperating
 with said frame and said support for coun-
 terbalancing and yieldingly supporting said
 uprights and said frame in position, a hori-
 zontally disposed bearing adjustably mount-
 ed on one of said uprights, a horizontally
 disposed shaft journaled in said last men-
 tioned bearing, a work engaging wheel fixed
 to the forward end of said shaft, the rear
 end thereof being adapted to be connected
 to a motor adapted to be mounted on said
 frame, a work support disposed under said
 wheel for holding the work in engagement
 with the periphery thereof, an extension fixed
 to the upper end of one of said uprights, a
 rod fixed at its lower end to said support and
 having its upper threaded end extending
 through said extension, a collar adjustably
 screw-seated on the threaded end of said rod,
 a coiled spring interposed between said col-
 lar and said extension for yieldingly forcing
 said wheel against the work, and an arm ful-
 crumed on said support and having one end
 in adjustable engagement with said exten-
 sion and having the opposite end operable to
 rock said arm and move said extension and
 parts associated therewith upwardly against
 the influence of said coiled spring.

3. In a grinding and polishing machine,
 the combination of a stationary support, a
 plurality of vertically disposed tubular bear-
 ings arranged in spaced-apart relation on
 said support, a pair of uprights slidably
 mounted in said bearings, a frame fixed to
 said uprights and movable therewith, a hori-
 zontally disposed shaft bearing adjustably
 carried by one of said uprights, a driven shaft
 journaled in said bearing, a grinding wheel
 fixed to one end of said shaft, a work support
 disposed below said wheel and movable rela-
 tively thereto for bringing the work into en-
 gagement with the periphery of said wheel,
 a telescopic vertically disposed member fixed
 at one end to said frame and at the other end
 to said support, a coiled spring on said tele-
 scopic member bearing at one end against
 said frame and fixed at the opposite end for
 counterbalancing and yieldingly supporting
 said frame and parts associated therewith,
 an extension fixed to one of said uprights, and
 a coiled spring cooperating with said exten-
 sion and said support for exerting spring
 pressure downwardly to bring the wheel in
 yielding engagement with the work, and
 means for regulating the tension of said
 spring.

4. In a grinding and polishing machine,
 the combination of a stationary support, a
 plurality of vertically disposed tubular bear-
 ings carried by said support, a pair of up-
 rights slidably mounted in said bearings, a
 frame fixed to said uprights, means cooperat-

ing with said frame and said support for
 counterbalancing and yieldingly supporting
 said uprights and said frame and parts car-
 ried thereby, a horizontally disposed shaft
 revolubly carried by one of said uprights and
 said frame, a work engaging wheel fixed to
 the forward end of said shaft, a work sup-
 port disposed below said wheel for present-
 ing the work into engagement therewith, a
 horizontally and laterally disposed extension
 fixed to one of said uprights, and means in-
 cluding a spring cooperating with said ex-
 tension and with said support whereby said
 uprights, frame, and parts carried thereby
 are yieldingly urged downward to bring the
 wheel in engagement with the work and are
 limited in their upward movement relatively
 to said support.

5. In a grinding and polishing machine,
 the combination of a stationary support, a
 plurality of vertically disposed tubular bear-
 ings carried by said support, a pair of up-
 rights slidably mounted in said bearings, a
 frame fixed to said uprights, means coop-
 erating with said frame and said support for
 counterbalancing and yieldingly supporting
 said uprights and said frame and parts car-
 ried thereby, a horizontally disposed shaft
 revolubly carried by one of said uprights and
 said frame, a work engaging wheel fixed to
 the forward end of said shaft, a work sup-
 port disposed below said wheel for presenting
 the work into engagement therewith, a hori-
 zontally and laterally disposed extension
 fixed to one of said uprights, and adjustable
 means cooperating with said extension and
 said support for yieldingly urging said up-
 rights and frame and parts carried thereby in
 one direction relative to said support and
 limiting the movement of said uprights and
 parts carried thereby in the opposite direc-
 tion, said means being adjustable to vary the
 yielding pressure.

6. In a grinding and polishing machine,
 the combination of a stationary support, a
 plurality of vertically disposed tubular bear-
 ings carried by said support, a pair of up-
 rights slidably mounted in said bearings, a
 frame fixed to said uprights, means cooperat-
 ing with said frame and said support for
 counterbalancing and yieldingly supporting
 said uprights and said frame and parts car-
 ried thereby, a horizontally disposed shaft
 revolubly carried by one of said uprights and
 said frame, a work engaging wheel fixed to
 the forward end of said shaft, a work support
 disposed below said wheel for presenting the
 work into engagement therewith, a horizon-
 tally and laterally disposed extension fixed to
 one of said uprights, a member adjustably
 mounted in said extension, manually opera-
 ble means for engaging said member and
 moving said upright, frame, and parts car-
 ried thereby upwardly to bring said wheel
 out of engagement with the work, and means

cooperating with said extension and said support for yieldingly bringing said uprights and parts carried thereby downwardly to bring said wheel against said work and for limiting upward movement of said uprights and parts carried thereby, said means including a rod fixed at one end to said support, and a coil spring cooperating with the other end of said rod and in engagement with said extension.

In testimony whereof I hereunto affix my signature this 14th day of June, 1925.

THEODORE F. PHILIPPI.

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