

Sept. 24, 1940.

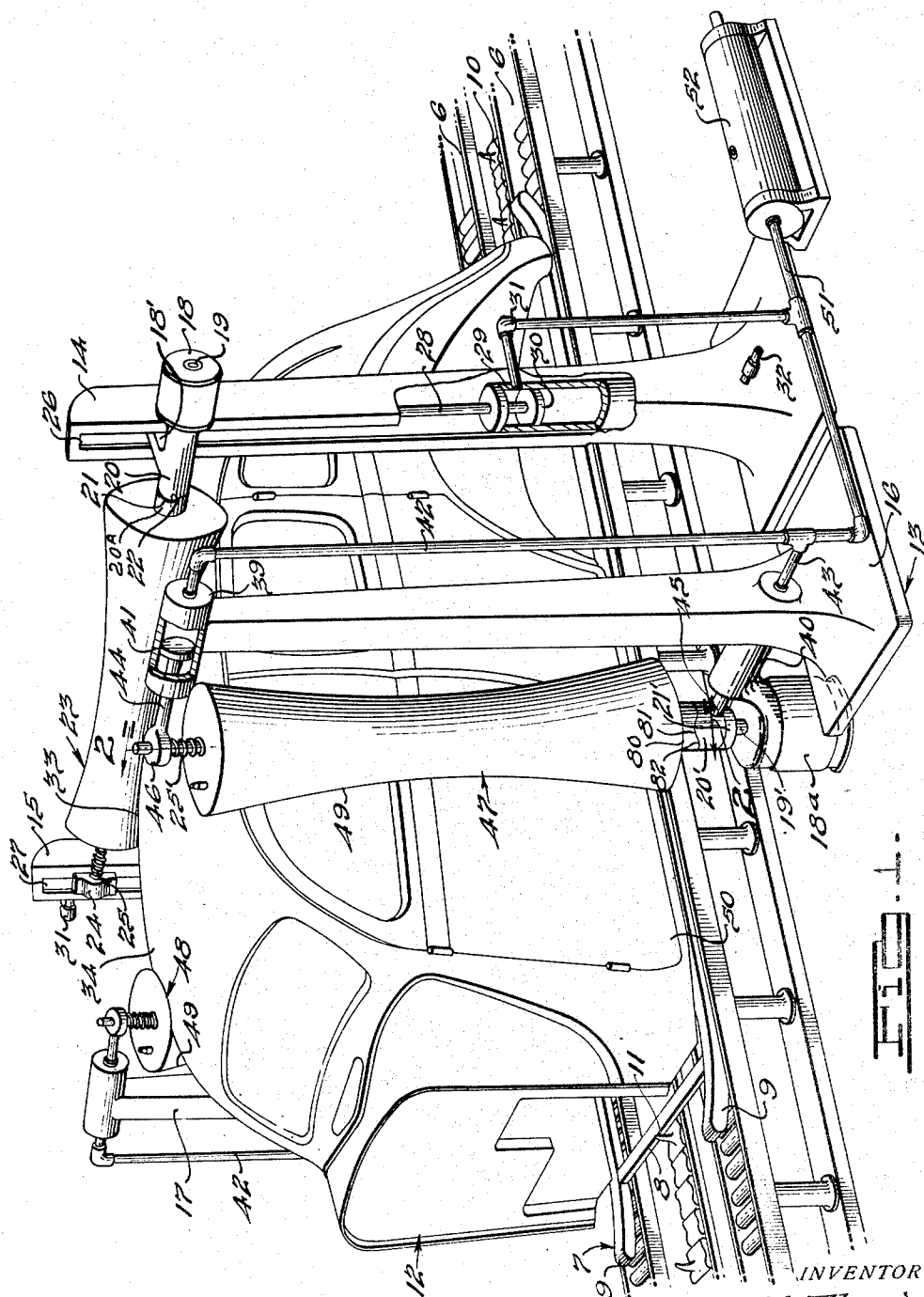
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2,215,692

FINISHING AND POLISHING APPARATUS

Filed Sept. 16, 1937

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

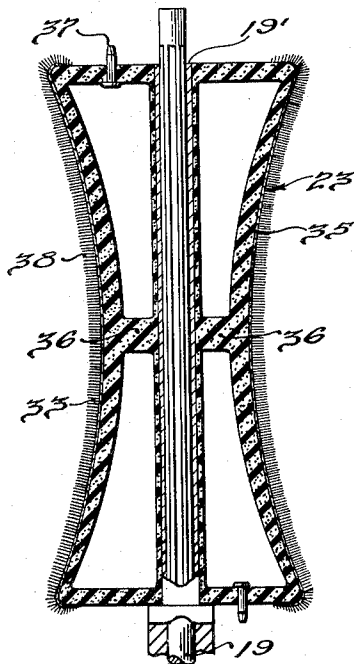


FIG. 2.

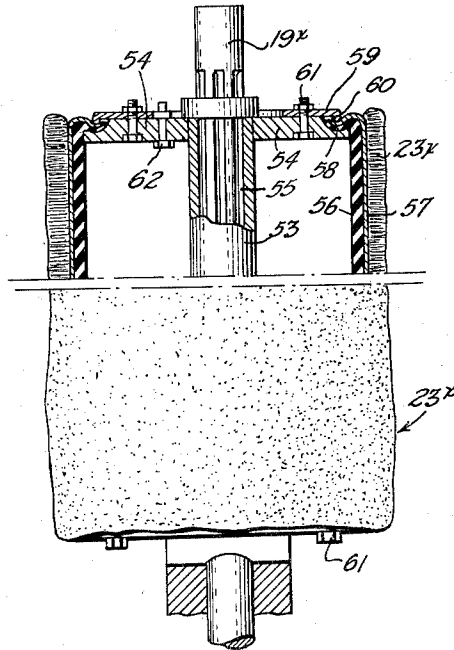


FIG. 3.

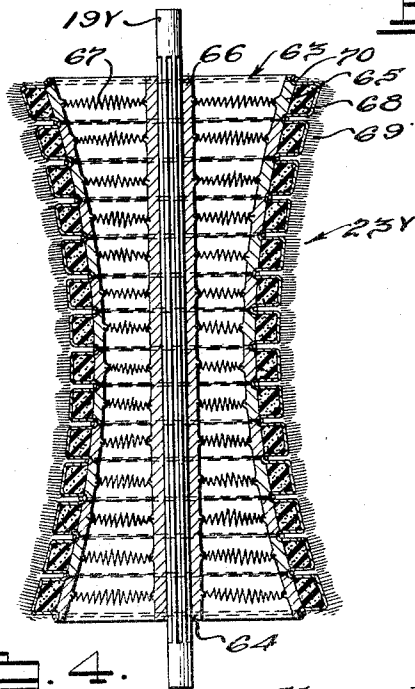


FIG. 4.

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UNITED STATES PATENT OFFICE

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FINISHING AND POLISHING APPARATUS

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2 Claims. (Cl. 51—192)

This invention relates to surface-treating apparatus, and more particularly to apparatus for treating surfaces of articles or stock which are being prepared for an application of paint, rust preventative, or some other surface coating material.

One of the main objects of the invention is to provide a surface-treating machine of this character by which angularly disposed surfaces of an object, such as an automobile body, for example, may be evenly finished or polished.

Another object of the invention resides in the provision of a surface-treating machine of this kind which automatically finishes or polishes the automobile body as the body is respectively moved into and out of surface-treating receiving positions.

Another object of the invention is the provision of drivingly rotated surface treating members which are simultaneously reciprocated during rotation.

A further object of the invention is the provision of surface-treating devices which are adapted during rotation to yield throughout a substantially wide range of deformation and undergo substantial displacement in order that one surface-treating device may be used to finish or polish surfaces of a comparatively wide variety of contours as well as relatively irregular surfaces.

Still further objects of the invention are the provision of apparatus for movably supporting and drivingly propelling articles to be surface-treated throughout a predetermined course during rotative and reciprocatory movement of the finishing or polishing device; to provide surface-treating control apparatus by which the surface-treating device is variably maintained at a predetermined pressure against the surface of the article operated upon; to provide a surface-treating device in a machine of this character which, when rotated, normally follows the contour of the surface of the article operated upon, and which device is adapted by reason of variable air or fluid pressures therein to bear, during rotation, with variable pressures against the surface of the article to be treated; and to provide a segmental surface-treating device in a machine of this kind which, when rotated, has each of its segments normally following a portion of the contour of the surface of the article to be treated, and which device is adapted by reason of mechanical means therein to bear through its segments, during rotation and reciprocation,

with a predetermined pressure against the surface of the article to be treated.

Other objects and advantages of the invention will be more apparent from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary perspective view of a surface-treating machine embodying the invention, parts being broken away to show the underlying structure, and in which is illustrated the application of surface-treating operations on a vehicle body.

Fig. 2 is a longitudinal section of one of the surface-treating devices, the view being taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view corresponding to Fig. 2, but illustrating a surface-treating member embodying a further embodiment of the invention.

Fig. 4 is a sectional view corresponding to Fig. 2, but illustrating a still further development of the invention.

In the form of the invention shown in the drawings, the improved machine comprises a pair of channel-shaped roller tracks 6 on which a skid, generally designated by the numeral 7, is movably mounted. The skid 7 comprises a substantially horizontal platform portion 8 and spaced runners 9, each of which are slidably received between the channel sides of the tracks 6. An endless conveyor chain 10 is disposed between the tracks 6 and is driven by a suitable power source (not shown). The conveyor chain 10 has upwardly extending lugs 11 which are engageable with the platform 8 and by which an article mounted thereon, such as the vehicle body generally designated by the numeral 12, may be propelled along the course predetermined by the track 6.

A generally vertical frame structure, generally designated by the numeral 13, is disposed in vertically upright position in a plane substantially normal to the path of movement of the vehicle body 12, along which the vehicle body is moved from left to right, as viewed in Fig. 1. This frame structure includes two pairs of upright stanchions 14, 15 and 16, 17.

Mounted on an angle member 18' is a prime mover 18 having a driving shaft 19 journaled in a bearing collar 20 carried by the angle member 18'. A cam face 21 is provided on the inner end of the bearing collar 20. The opposite end of the shaft 19 is rotatably and vertically shiftably mounted in a bearing block 24 slidably mounted on the stanchions 15. A surface-treating mem-

ber, generally designated by the numeral 23, is non-rotatably but axially shiftably mounted by means of splines on the shaft 19 between the stanchions 14 and 15. The member 23, herein-
 5 after more specifically described, is yieldably urged to the stanchion 14 by a spring 25 bearing between the end of the member 23 adjacent the bearing block 24 and the latter. A collar 20^a fixed on the opposite end of the member 23 is
 10 provided with a cam face 22 which registers and coacts with the cam face 21 of the bearing collar 20. The top device 23 is thus permitted to rotate and is simultaneously reciprocated by the action of the cam faces 21 and 22.

15 The motor supporting bracket 18' and the bearing 24 are guided within vertical slots 26 and 27 formed within the stanchions 14 and 15, respectively. To control the relative vertical positions of the prime mover 18 and the bearing 24, a hydraulic control system is used. Inasmuch
 20 as this hydraulic control for both the prime mover 18 and the bearing 24 are similar, I have illustrated only the hydraulic control for the former. This hydraulic control includes a piston
 25 rod 28 fixed at one end to the motor bracket 18'. The other end of the rod 28 extends in leak-proof engagement into a vertical cylinder 29 within which a piston 30, attached to the rod, is adapted to reciprocate in response to fluid,
 30 preferably liquid, under pressure, admitted through a conduit 31, as will hereinafter be more apparent. The cylinder 29 is fixed to the stanchion 14 and carries a relief conduit 32 which drains the fluid that accumulates below the piston
 35 30.

Formed on the top surface-treating device 23, best shown in Fig. 2, are concave surfaces 33 which are deformed to contacting conformity with the top surface of the body generally indicated by the numeral 34. The top surface-treating
 40 device 23 preferably includes an air-tight tubular body portion 35 comprising rubber or other substantially air impervious and yieldable material which receives air or fluid under a predetermined pressure through a valve 37 as will
 45 presently be more apparent. A center web portion 36 may be employed to tie the central portion of the wall of the body part of the device to a longitudinally extending metal sleeve 19' through which the shaft 19 extends. A covering
 50 of buffing or abrasive material 38 is preferably carried by the body portion 23 if it is desired to use the device 23 as a buffer or finisher, respectively, it being understood that the device
 55 23 may be used to apply rust-resistant waves or other material to the body 12 without departing from the scope of my invention.

The stanchion 16 carries a pair of parallel substantially horizontal cylinders 39 and 40 within each of which a piston 41 is disposed. The pistons are adapted to be actuated by fluid pressure admitted into the cylinders 39 and 40 through pressure conduits 42 and 43, respectively, as will presently be more apparent. The
 65 pistons 41 carry piston rods 44 and 45 which support a side concave surface-treating device 47 that is supported similarly to the top device 23. A prime mover 18^a is suspended from a bearing collar 21' on the outer end of the rod
 70 45 of the stationary member 16. The motor 18^a has a shaft 19' journaled in the bearing collar 20' and in a bearing 46 on the outer end of the piston rod 44 of the upper cylinder 39. A spring 25' bears between the upper end of the device
 75 47 and the bearing 46. Fixed to the lower end

of the device 47 is a collar 30 having a cam face 31 registering and coacting with a cam face 32 on the upper end of the bearing collar 20'. During rotation of the treating device 47 the cam
 5 faces 31 and 32 and spring 25' cause the latter to reciprocate vertically in the directing of its rotative axis. Inasmuch as the construction and function of the devices 23 and 47 are alike, their details will not be repeated.

A side concave surface-treating device 48
 10 identical in construction with the devices 23 and 47, is carried on the stanchion 17 in a manner similar to that by which the device 47 is mounted on the stanchion 16, the devices 47 and 48 being rotated and reciprocated in identical manner. The side devices 46 and 48 have concave
 15 surfaces 49 which conform generally with the side surfaces of the body 12, generally indicated by the numeral 50 which are deformable into contacting relationship with such surfaces.

Fluid, preferably liquid, is supplied under a predetermined pressure to the conduits 31, 42 and 43 through a main conduit 51 from a suitable pressure supply source such as a cylinder 52.

In the operation of this embodiment of my invention, the vehicle body 12 is moved on the
 25 tracks 6 by the conveyor chain 10 to the right as viewed in Fig. 1. The devices 23, 47 and 48 are preferably filled with air to a predetermined pressure. When these devices, while rotating and reciprocating and during movement of the
 30 vehicle body, are urged under predetermined pressure by the pistons 30 and 41 against the surfaces of the work, the curvilinear surfaces of these devices will be in contacting conformity, with successive longitudinally adjacent portions
 35 of the top and side surfaces of the vehicle body.

The prime mover 18 simultaneously rotates the shaft 19 so as to rotate the top device 23 and to cause the device 23 to reciprocate in the direction
 40 of its axis by the riding of the cam face 22 on the stationary cam face 21. As the prime movers 18^a operate they simultaneously rotate the shafts 19' and cause the devices 47 and 48 to reciprocate in the direction of their axes by the riding of the
 45 cam faces 22' on the stationary cam faces 21'.

Sufficient fluid pressure is admitted from the cylinder 52 to the conduits 31, 42, and 43 to cause the pistons 30 and 41 to urge the rotating and reciprocating air-filled devices 23, 47 and 48 against
 50 the top and side surfaces of the vehicle body with the desired rubbing pressure of these devices. Any fluid in the cylinders that escapes below the pistons 30 and 41 is removed through the relief conduit 32.

During this portion of the vehicle body movement, the side surfaces 50 of the vehicle body automatically come into contact with the rotating and reciprocating devices 47 and 48. The
 55 surfaces 33 of the devices 47 and 48 are deformable into contacting relationship with the body surfaces 33.

As the vehicle body moves further along the tracks 6, the top surface 34 automatically comes into contact with the air-filled rotating and reciprocating device 23, the deformed surfaces 33 coming into contacting conformity with the body
 65 surface 34 to be surface-treated. The direction of rotation of the shaft 19 is preferably such that it will assist the top device 23 to climb when this device first comes into contact with the substantially lowest portion of the top surface of the illustrated vehicle body. However, the direction
 70 of rotation of the devices 23, 47 and 48 may be

predetermined to work with or against the movement of the body as desired.

When the vehicle body passes out of surface-treating receiving relationship with the devices 23, 47 and 48 the body has been evenly surface-treated by these devices which rotate and reciprocate under a predetermined rubbing pressure. The pressure within the devices 23, 47 and 48 and within the cylinders 29, 39 and 40 may be varied at will to effect the desired condition of surface-treating by these devices.

Referring now to the modified embodiment illustrated in Fig. 3, I have provided another form of surface-treating device for my surface-treating apparatus. It will be understood that this modified construction is intended to be substituted for the corresponding parts previously described and the entire mechanism and the operation of the same will not again be duplicated. I have indicated parts of similar function but different construction by primed "X" reference characters.

Attention is directed to the fact that the deformed concave surfaces of the devices 23, 47 and 48 of the Fig. 2 embodiment have been eliminated. The surface-treating device 23* comprises a body member 53 having a pair of end portions 54, the member 53 preferably being formed of aluminum or some other similar light material. Internal splines 55 are formed with the body member 53 to receive the drive from the splined shaft 19* and to reciprocate thereon by the riding of the cam surface 22 on the cam surface 21.

An inner layer of rubber 56, or other substantially air impervious material and preferably an outer layer of sheepskin 57 form the cylindrical walls of the device 23*. The extremities of the layers 56 and 57 are locked within an annular groove 58 of each of the end portions 54 by a steel plate 59 having a flange 60 registering with the groove 58. The plate 59 is detachably secured to the end portions 54 by a steel plate 59 having a flange 60 registering with the groove 58. The plate 59 is detachably secured to the end portions 54 by suitable fasteners 61. Air, or fluid, may be admitted under a predetermined pressure through a valve 62 into the body member 53.

In the operation of this particular embodiment the deformable outer layer 57, backed by the layer 56, is urged by the air within the layer 56 into contacting conformity with the top or side surfaces of the vehicle body when the pistons 30 or 41 also urge the rotating and reciprocating surface-treating devices toward the vehicle body surfaces.

The embodiment shown in Fig. 3 is particularly adapted for polishing surfaces, but it is evident that other layers besides sheep skin abrasive and rubber may be used without departing from the scope of my invention.

With reference now to the modified embodiment illustrated in Fig. 4, still another construction of a surface-treating device for my surface-treating apparatus has been provided. It will be understood that this modified arrangement is intended to be substituted for the corresponding parts previously described and the entire mechanism and the operation of the same will not be duplicated again. Parts of similar function but

different construction have been indicated by primed "Y" reference characters.

The surface-treating device 23^y comprises a spool-like body member 63 having internal splines 64 to simultaneously receive the drive from the splined shaft 19^y and to reciprocate thereon by the riding of the cam surface 22 on the cam surface 21.

A plurality of ring members 65 surround the stem portion 66 of the body member 63, these ring members being yieldingly centered under a predetermined force by springs 67 carried by the inner portion of the members 65 and by the stem portion 66. These ring members 65 are preferably made of aluminum or some other light material, and have their peripheries so shaped as to normally be deformed into contacting conformity with successively adjacent portions of the top surface of the vehicle body during rotation and reciprocation of the top device 23^y. Each of the members 65 carries a suitable surface-treating material, the material illustrated being a ring of sponge rubber 68 covered by a layer of sheep-skin 69 held by detachable wire rings 70 to the member 65. An outer surface of abrasive material may be used if desired.

Referring to the operation of this embodiment of my invention, the sheep-skin covered members 65 are individually urged to their normal central position. These members 65 are thus deformed into contacting conformity with the top or side surfaces of the vehicle body when the pistons 30 or 41 also urge the rotating and reciprocating surface-treating devices with a predetermined rubbing pressure toward the vehicle body surfaces.

Although but several specific embodiments of my invention are herein shown and described, it will be understood that various changes in the size, shape and arrangement of parts may be made without departing from the spirit of my invention.

What I claim is:

1. A surface treating member of drum-like form including end walls and a connecting wall, an annular wall between said end walls dividing said drum-like member into a pair of chambers and serving as a tie for said connecting wall to restrain radially outward distortion thereof, said walls being of yieldable fluid-impervious non-metallic material, and valve means for admitting an inflating fluid to each of said chambers.

2. A surface treating member of drum-like form including end walls, an annular radially outwardly disposed axially extending connecting wall, a hub forming wall extending between said end walls and spaced radially inwardly from said connecting wall, an annular wall disposed axially intermediate said end walls and extending radially between said connecting wall and said hub forming wall and constituting a tie for said connecting wall to restrain radially outward distortion thereof, all of said walls being of yieldable fluid-impervious non-metallic material, said intermediate axially extending wall dividing said drum-like member into independent chambers, and valve means for admitting an inflating fluid to each of said chambers.

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