

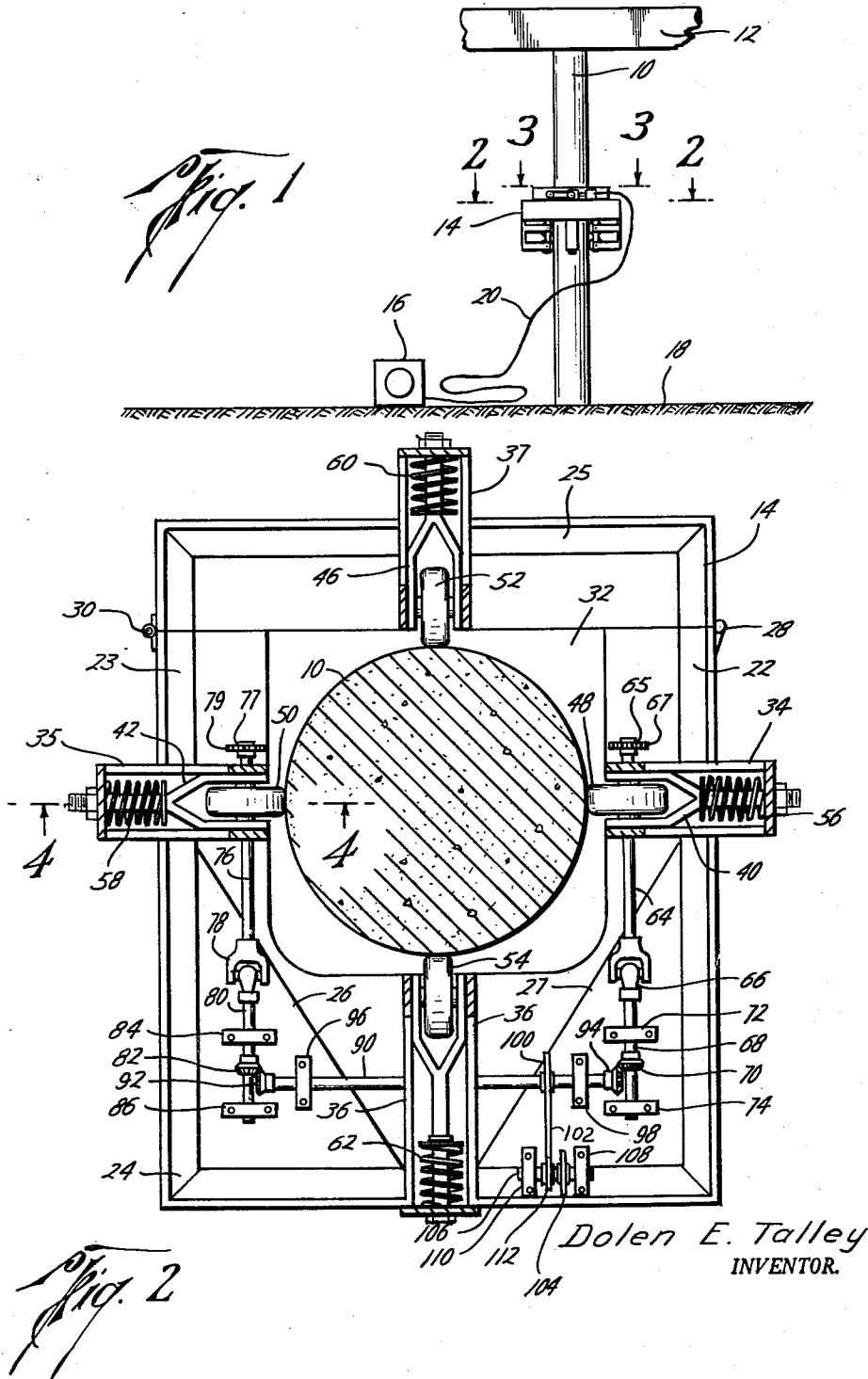
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COLUMN POLISHER

3,117,401

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2 Sheets-Sheet 1



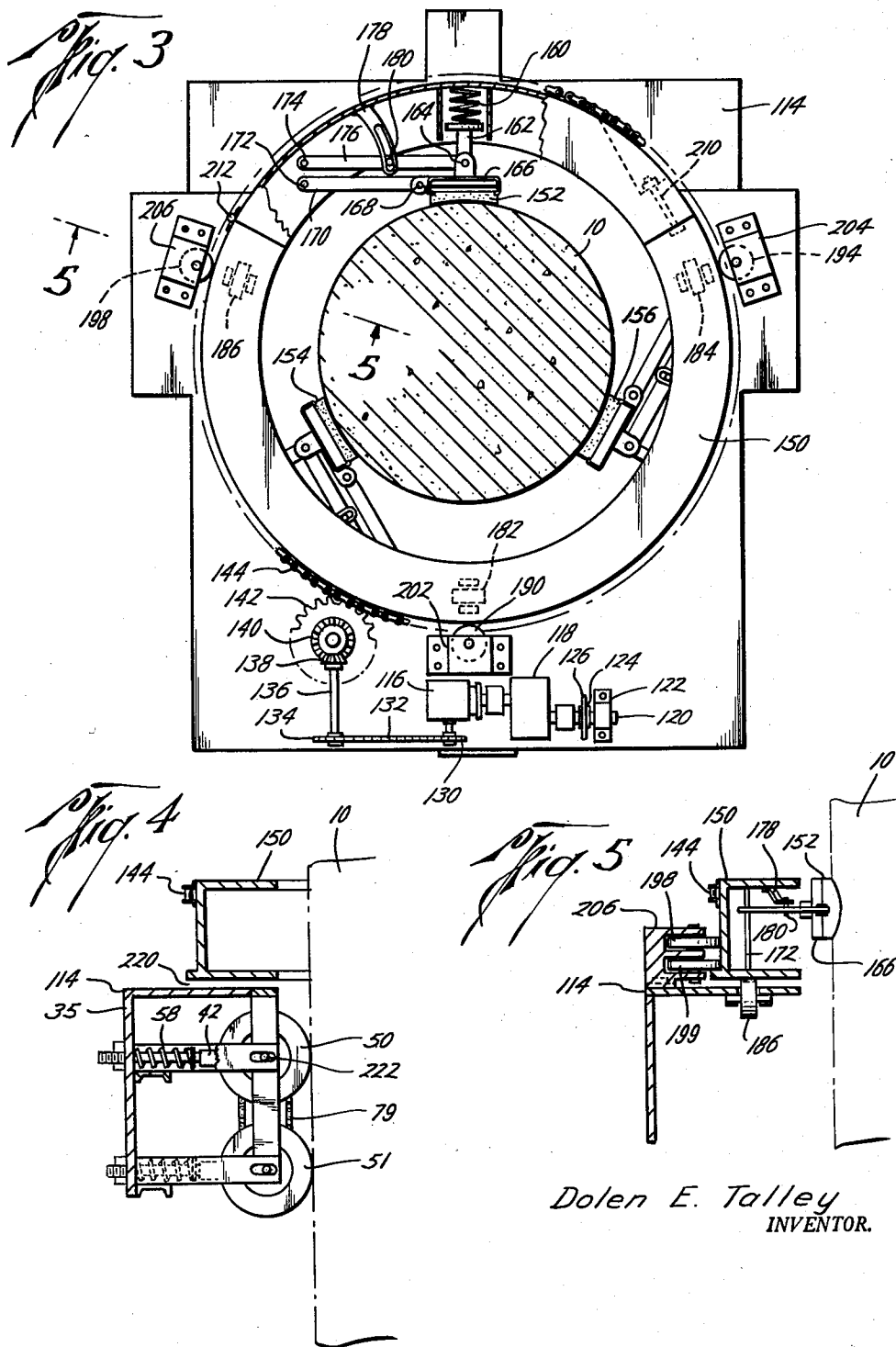
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1

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COLUMN POLISHER

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2 Claims. (Cl. 51—241)

This invention pertains generally to apparatus for finishing concrete structures and the like and particularly to apparatus for finishing and polishing concrete columns having a substantially circular cross-section.

In recent years, many roadway and structural designs have utilized as supporting elements, posts and columns made of concrete or the like which have uniform or substantially uniform circular cross-sections. Such posts and columns have found wide use as vertical supports for bridges and other elevated roadways, as foundation elements, and as structural elements for buildings. Usually the posts and columns are disposed in a substantially vertical position.

The posts and columns are usually constructed by setting up a form about a latticed reinforcing assembly and pouring unset concrete into the form to fill the form and to fill all spaces of the reinforcing assembly, so that when the concrete is set a reinforced structure will be provided. After the concrete is set, the form is stripped off to expose the concrete surface.

Many types of forms are used, shaped sectional metal forms and wrapped forms of paper or other composition are used. In the case of metal forms, irregularities in the concrete's surfaces of the post or column invariably occur at the points of joinder of the form sections. In the case of wrapped forms, the paper or other sheet composition is wrapped in an overlapped spiral helix, so that when the form is removed from the set concrete surface, a spiral irregularity results due to the overlapped joints of the form. All outer surfaces of such molded posts and columns are usually found to be somewhat irregular when the form of any type is removed. The outer surface irregularity may be due to the coarse nature of the aggregate used in the concrete mixture, lack of wetting characteristics between the form and unset concrete unevenness of the mold surfaces, or other reasons.

Such surface irregularities make it necessary to finish substantially all posts and column structures after removal of the form, for the sake of appearance, to meet specifications of engineers or architects, to reduce the deterioration from exposure to weather conditions, and for other reasons. It has been conventional practice to finish or polish the columns or posts by hand through the use of hand-applied grinding blocks and stones or other suitable devices and agents. Such manual polishing necessitates use of scaffolding or expensive equipment such as forklift trucks, and also requires a minimum of two workers who usually polish the posts or columns from the bottom to the top and again from the top of post or column to the bottom. Needless to say, such manual finishing leaves much to be desired from the points of view of time, uniformity, and economy.

Thus, an object of the present invention is to provide apparatus for mechanically polishing concrete structures.

Another object of the present invention is to provide apparatus which is particularly suitable for finishing concrete posts and columns which are used in freeway or highway construction, such posts and columns having a generally circular cross-section.

Another object of the present invention is to provide apparatus for polishing columns, such apparatus being characterized by its efficiency and dependability to thereby reduce overall construction costs and to save time with

2

respect to known apparatus and methods of polishing and finishing.

Briefly described, the present invention comprises apparatus for polishing or finishing a concrete column or post. In a preferred embodiment of the invention, the apparatus includes a platform adapted for engagement with the posts or column to be finished. Such platform may be hydraulically or pneumatically actuated through lines which are connected to related pumping apparatus located on the ground near the posts or column which is being polished. The hydraulic or pneumatic means mounted on the platform provide vertical movement of the platform and also provide rotational movement to a ring coupled above the platform. The vertical and rotational movement may occur simultaneously or separately. The ring has coupled thereto a plurality of abrasive blocks or discs which finish or polish the concrete post as a circular ring rotates. As the platform moves vertically along the posts or columns, polishing of the periphery of the entire axial length of such posts or columns is achieved. The abrasive blocks or discs are adapted for rapid removal and substitution of new blocks or discs when necessary.

Other objects and advantages will appear in the following description of a preferred embodiment of the invention, reference being made to the accompanying drawings of which:

FIGURE 1 is a side elevation of the polishing apparatus in engagement with a column or post to be polished;

FIGURE 2 is a plan view partly in cross-section taken at line 2—2 of FIGURE 1;

FIGURE 3 is a plan view partly in cross-section taken at line 3—3 of FIGURE 1;

FIGURE 4 is a side elevation of the polishing apparatus taken along line 4—4 of FIGURE 2; and

FIGURE 5 is a side elevation taken along line 5—5 of FIGURE 3.

Referring now to the drawings in detail, FIGURE 1 shows a column 10 supporting a structure 12. Polishing apparatus 14 is positioned for engagement along the longitudinal axis of column 10. Suitable apparatus 16 is positioned on the ground 18 to provide a source of hydraulic or pneumatic pressure through line 20 to polishing apparatus 14.

FIGURE 2 is a partial cross-sectional plan view of polishing apparatus 14 taken along line 2—2 of FIGURE 1. The polishing apparatus 14 is comprised of two long right-angle members 22 and 23 and two short right-angle members 24 and 25. Triangular-shaped plates 26 and 27 are connected to the juncture of members 23 and 24 and members 22 and 24, respectively, to provide rigidity to the structure and to support the drive mechanism which provides vertical movement to the apparatus.

Member 25 is pivotal about hinge 28 and may be rigidly connected for non-pivotal movement by fastener 30. Member 25 is pivoted to provide free access to opening 32 when the polishing apparatus is being positioned on a column 10 to be polished and pivotal member 25 also provides for removal of the polishing apparatus after the column has been polished.

Each right-angle member 22, 23, 24, and 25 has positioned thereon wheel support structures 34, 35, 36, and 37. Each support structure includes two fork members with only one fork member 40, 42, 44, and 46 in each support structure being shown. A wheel or roller 48, 50, 52, and 54 is positioned on an axle mounted in the fork to allow rotation of the wheels as the polisher is moved vertically along the column. Resilient means such as springs 56, 58, 60, and 62 are positioned around the single segment of each fork to provide frictional engagement of the wheels with the column 10. The resilient means must exert sufficient compressive force to move the polishing

3

apparatus upwardly when drive power is applied to the wheels of support structures 34 and 35.

Wheel 48 of support structure 34 is driven by shaft 64 which is coupled through a universal joint 66 to shaft 68 having a bevel gear 70 thereon. Support members 72 and 74 provide stability to the shaft 68.

Similarly, wheel 50 of support structure 35 is driven by shaft 76 which is coupled through universal joint 78 to shaft 80 having a bevel gear 82 thereon. Support members 84 and 86 provide stability to the shaft 80. Sprocket 65 on the end of shaft 64 has a chain 67 thereon for driving a wheel which is below wheel 48. Similarly, sprocket 77 on the end of shaft 76 has a chain 79 thereon to drive a wheel which is below wheel 50.

On one end of drive shaft 90 is a bevel gear 92 which engages bevel gear 82. Bevel gear 94 on the other end of shaft 90 engages bevel gear 70. Support members 96 and 98 stabilize shaft 90. Sprocket 100 on shaft 90 is coupled through chain 102 to sprocket 112 which is coupled to shaft 106. Shaft 106 is mounted on supports 108 and 110. Sprocket 104 is also coupled to shaft 106 and is the primary power source for causing the polishing apparatus to move vertically through the friction wheel drive mechanism just explained.

The wheels in support structures 36 and 37 are used for stabilizing the polishing apparatus but there may be instances where suitable driving mechanism might be coupled to the wheels in support structures 36 and 37. Thus, FIGURE 2 is directed to disclosing the components which provide vertical movement to the polishing apparatus.

FIGURE 3 is a plan view of the polishing apparatus taken along line 3—3 of FIGURE 1. The mechanism shown in FIGURE 2 is concealed by plate 114 on which is mounted a hydraulic or pneumatic device 116 which is coupled to a gear reduction box 118. Shaft 120 extends from the box 118 and is supported on support member 122. Sprocket 124 on shaft 120 has a chain 126 which is coupled to the sprocket 104 shown in FIGURE 2. Although a single power device 116 is shown which provides power for vertical and rotational movement of the polishing apparatus, it may be desirable to have a separate power source for vertical movement of the polishing apparatus and another power source to provide rotational movement.

Device 116 is coupled through sprocket 130 and chain 132 to sprocket 134 on shaft 136. Bevel gear 138 on the end of shaft 136 is in engagement with bevel gear 140 coupled to sprocket 142. Sprocket 142 is in engagement with chain 144 which is attached to ring 150 to provide rotation thereof. Rotation of ring 150 provides polishing or finishing of column 10 through the abrasive action of blocks 152, 154 and 156 which are coupled to linkage mechanism on ring 150.

The linkage mechanism of block 152 is shown in the cut-away portion in the upper part of FIGURE 3. A resilient means such as a spring 160 is positioned between the outside of ring 150 and a pivotal member 162 which is coupled through pin 164 to block holder 166. Block holder 166 has another pin 168 which provides pivotal movement to member 170 which is coupled to rod 172 which is connected to ring 150. Also connected to ring 150 is a rod 174 to which is coupled member 176. Member 176 is coupled at its other end to pin 164 on holder 166. Slotted member 178 is coupled to ring 150 and a protrusion 180 on member 176 is slidably engaged in the slot of member 178. Thus during rotation of ring 150 the block 152 is pushed against column 10 by the compressive action of spring 160 yet the linkage mechanism provides a floating effect whenever movement of block 152 away from the column is necessary.

Blocks 152, 154, and 156 may be positioned along the longitudinal axis of the column to be polished to provide either a wide or narrow polishing swath on the surface of the column. The polishing blocks may be of a variety of

4

configurations but substantially rectangular blocks are preferred.

As ring 150 is rotated, rollers 182, 184, and 186 elevate the ring 150 from base plate 114. Rollers 190, 194, and 198 provide stability to ring 150 and aid in maintaining the ring 150 in a substantially concentric position relative to the column. Another roller is below roller 190, 194, and 198 and each pair of rollers is positioned on supports 202, 204, and 206, respectively. Supports 202, 204, and 206 are mounted to base plate 114 through suitable fasteners such as screws.

When the polishing apparatus is being assembled for engagement with a column or when removing the polishing apparatus from a column, bolt 210 is removed and a segment of ring 150 is pivoted on hinge 212 in a manner similar to the pivotal movement provided for member 25 as described previously.

FIGURE 4 is an elevation view taken along line 4—4 of FIGURE 2 with ring 150 and plate 114 included for the sake of clarity in showing how the ring is positioned above the plate with an opening 220 therebetween. FIGURE 4 is directed to disclosing the vertical movement of the polishing apparatus.

Support structure 35 accommodates rollers 50 and 51 which each have sprockets coupled together by chain 79. As explained previously, spring 58 acts against fork 42 to engage wheel 50 with the column sufficiently to allow friction driving of the polishing apparatus to be maintained thereby providing vertical movement of such apparatus. Recess 222 for the axle of the roller 50 allows spring 58 to act with compressive force on roller 50. Lower wheel 51 is actuated in a manner similar to that described for upper wheel 50.

FIGURE 5 is an elevation view taken along line 5—5 of FIGURE 3 and FIGURE 5 is directed to disclosing the aspects of rotational movement of the polishing apparatus as explained in connection with FIGURE 3. Roller 199 was not shown in FIGURE 3 but may be seen in FIGURE 5. As ring 150 rotates, block 152 polishes or finishes a portion of the column 10. As was shown in FIGURE 4, ring 150 remains above plate 114 and rides on roller 186. Rollers 198 and 199 provide stability to the ring and also position the ring so that it is concentric to the column.

Thus the invention provides polishing apparatus which is engaged with a column or post. Polishing of the post occurs as the polishing apparatus moves vertically along the longitudinal axis of the column. While such vertical movement is occurring, part of the polishing apparatus rotates around the post thereby polishing the same. The polishing apparatus of this invention provides apparatus which has been needed for some time in the construction business.

While a preferred embodiment of the invention has been shown and described, it is to be understood that all forms of the invention which are covered by the following claims are sought to be protected by Letters Patent. I claim:

1. Apparatus for polishing the periphery of a fixed, substantially vertical concrete column, said apparatus including in combination

a platform having a plurality of side members with at least one of said plurality of side members having a pivotal coupling to allow the column to be disposed within the platform,

friction drive means coupled to said platform, said friction drive means including a plurality of wheels and resilient means for biasing each of said plurality of wheels toward the column for frictional engagement therewith,

polishing means including an annular ring adapted for positioning around the column, a plurality of abrasive blocks coupled to said annular ring, and biasing means coupled to said plurality of abrasive blocks to cause said blocks to engage the periphery of the column, and

5

motive means coupled to said platform, to said friction drive means, and to said annular ring to provide movement of said platform vertically along the longitudinal axis of the column and to provide rotational movement to said annular ring whereby said plurality of abrasive blocks polish the periphery of the column during both upward and downward movement of said platform.

5

2. Apparatus for polishing the periphery of a fixed, substantially vertical concrete column, said apparatus including in combination

10

a platform having a plurality of side members with at least one of said plurality of side members having a pivotal coupling to allow the column to be disposed within the platform,

15

friction drive means coupled to said platform, said friction drive means including a plurality of wheels and resilient means for biasing each of said plurality of wheels toward the column for frictional engagement therewith,

20

polishing means including an annular ring adapted for positioning around the column, a plurality of abrasive blocks coupled to said annular ring, and biasing means

6

coupled to said plurality of abrasive blocks to cause said blocks to engage the periphery of the column, and

motive means coupled to said platform, to said friction drive means, and to said annular ring to provide movement of said platform vertically along the longitudinal axis of the column and to provide rotational movement to said annular ring whereby said plurality of abrasive blocks polish the periphery of the column during both upward and downward movement of said platform, the rotational movement of said annular ring during descent of said platform being opposite to the rotational movement of said annular ring during ascent of said platform.

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