Oct. 24, 1967 J. P. ZACHEK 3,348,342

FINISHING MACHINE

Filed July 22, 1964 6 Sheets-Sheet 1

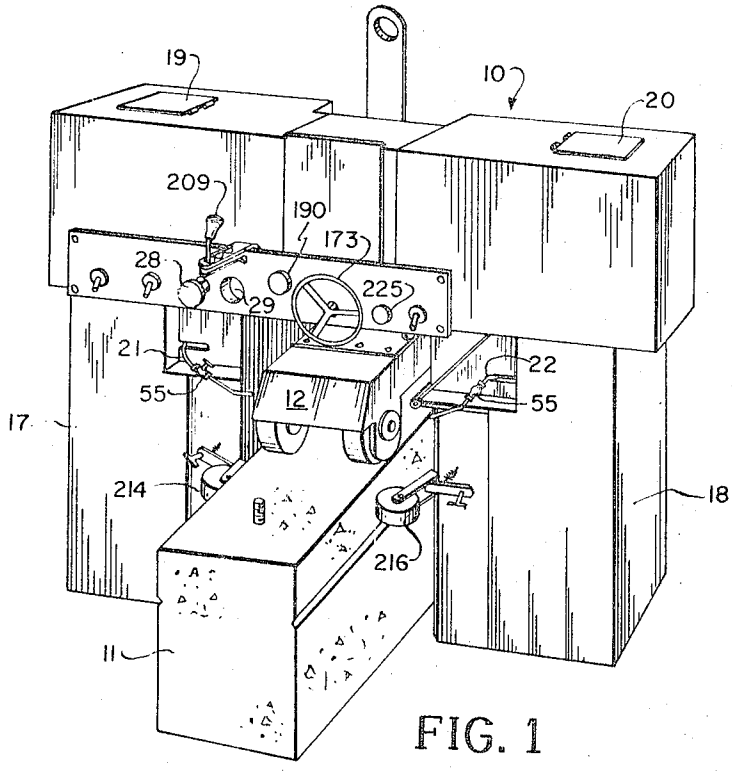


FIG. 1

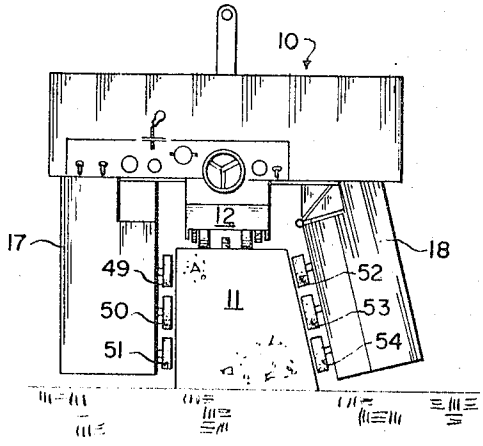


FIG. 2

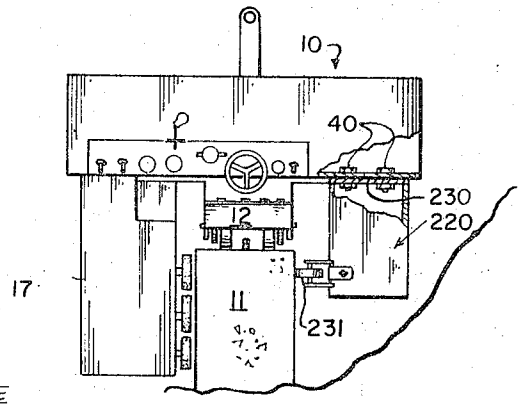


FIG. 3

INVENTOR.
JOSEPH P. ZACHEK
BY Dominik and Stein

ATTORNEYS

Oct. 24, 1967 J. P. ZACHEK 3,348,342

FINISHING MACHINE

Filed July 22, 1964 6 Sheets-Sheet 2

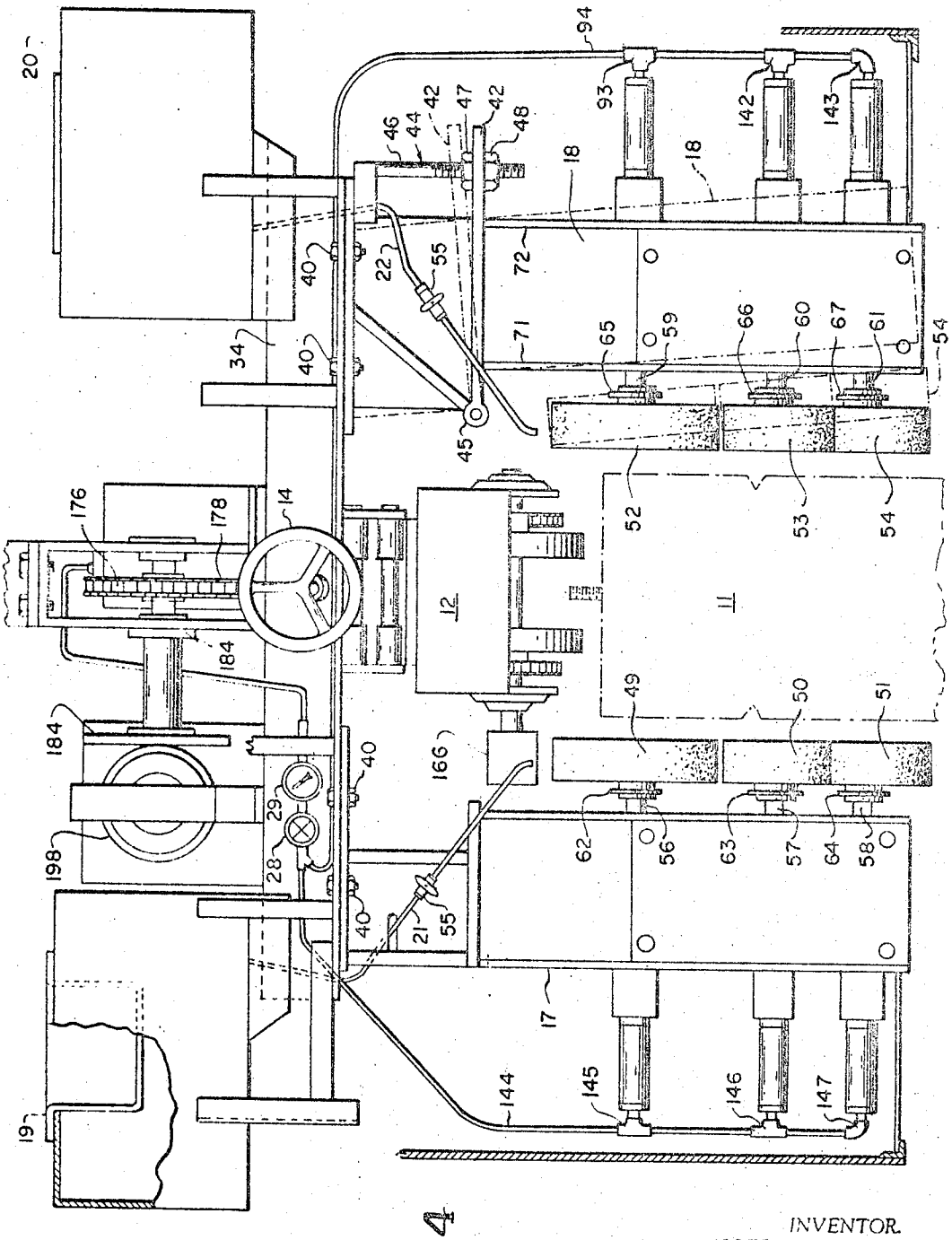


FIG. 4

INVENTOR.
JOSEPH P. ZACHEK
BY Dominik and Stein

ATTORNEYS

Oct. 24, 1967 J. P. ZACHEK 3,348,342

FINISHING MACHINE

Filed July 22, 1964 6 Sheets-Sheet 3

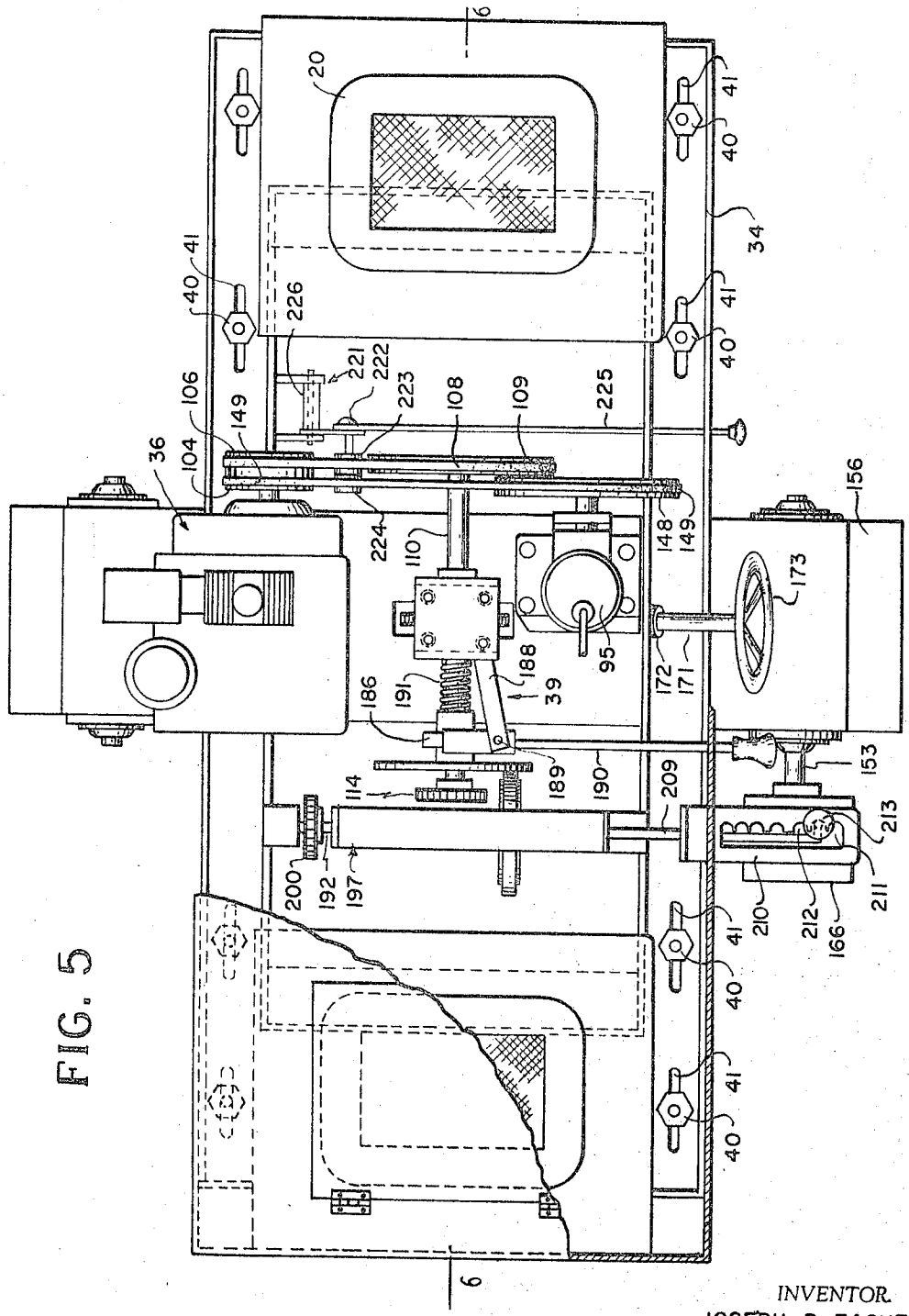


FIG. 5

INVENTOR.
JOSEPH P. ZACHEK
BY Dominik and Stein
ATTORNEYS

Oct. 24, 1967 J. P. ZACHEK 3,348,342

FINISHING MACHINE

Filed July 22, 1964 6 Sheets-Sheet 4

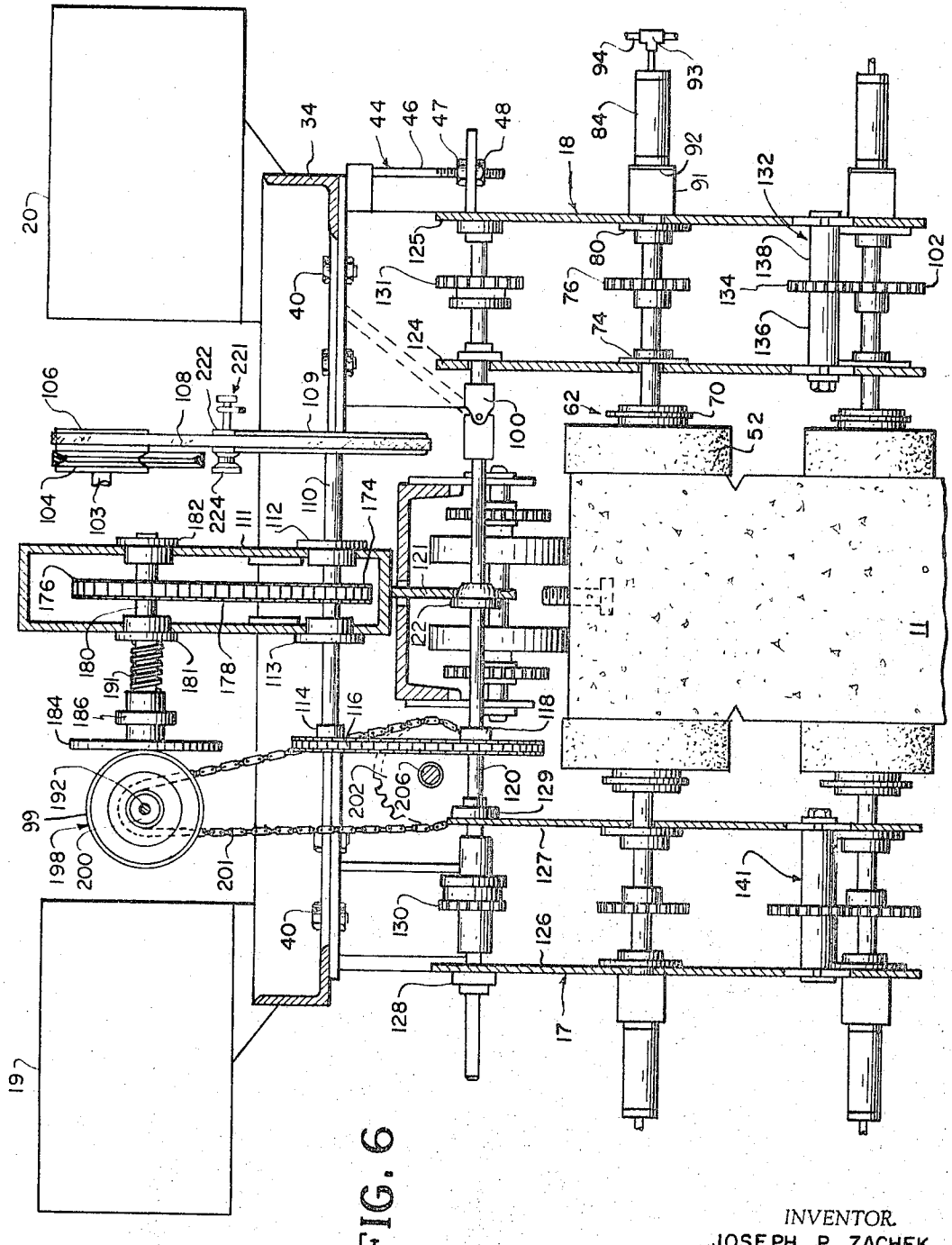


FIG. 6

INVENTOR.
JOSEPH P. ZACHEK
BY Dominik and Stein

ATTORNEYS

Oct. 24, 1967 J. P. ZACHEK 3,348,342

FINISHING MACHINE

Filed July 22, 1964 6 Sheets-Sheet 5

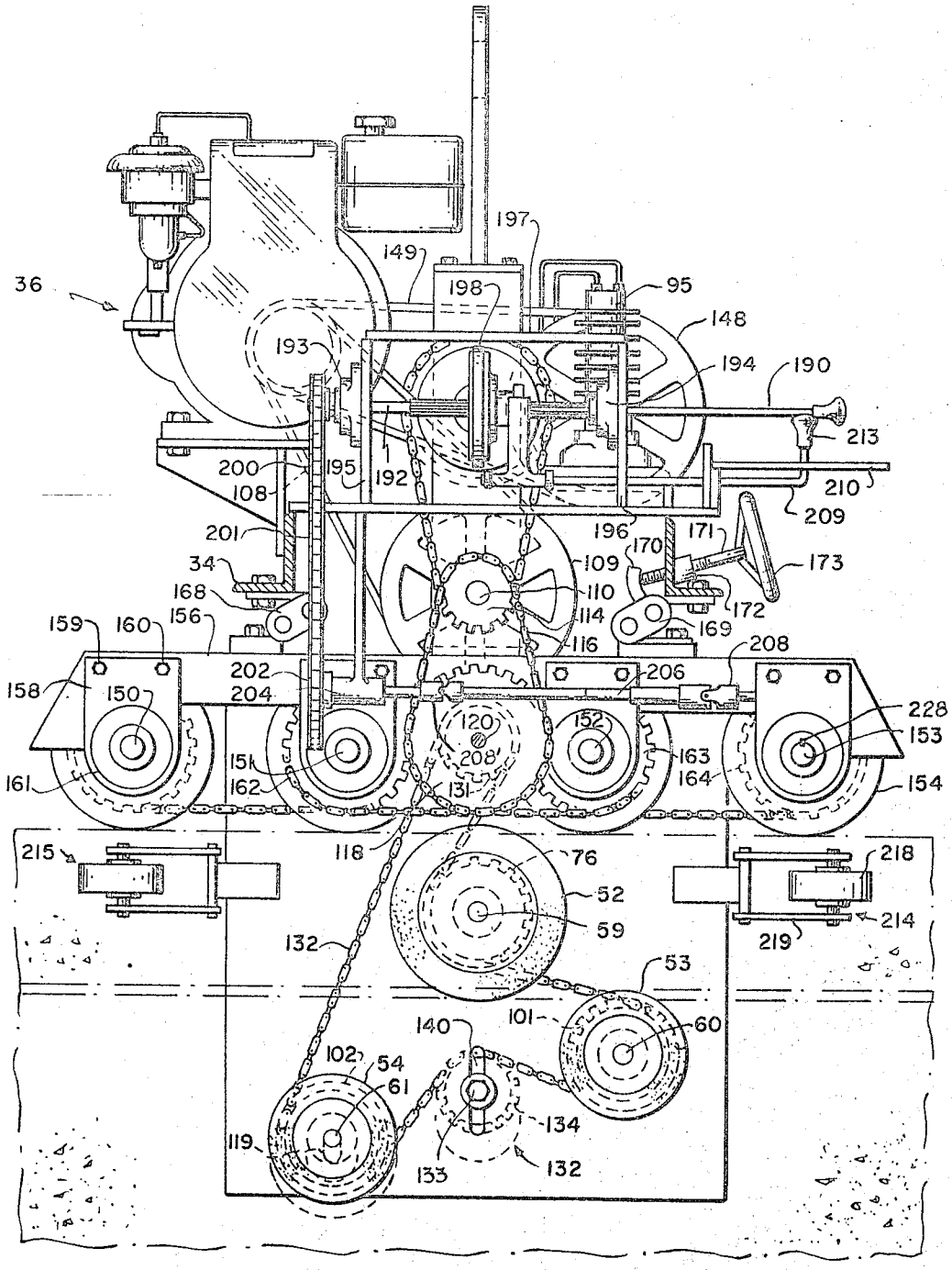


FIG. 7

INVENTOR.
JOSEPH P. ZACHEK
BY Dominik and Stein

ATTORNEYS

Oct. 24, 1967 J. P. ZACHEK 3,348,342

FINISHING MACHINE

Filed July 22, 1964 6 Sheets-Sheet 6

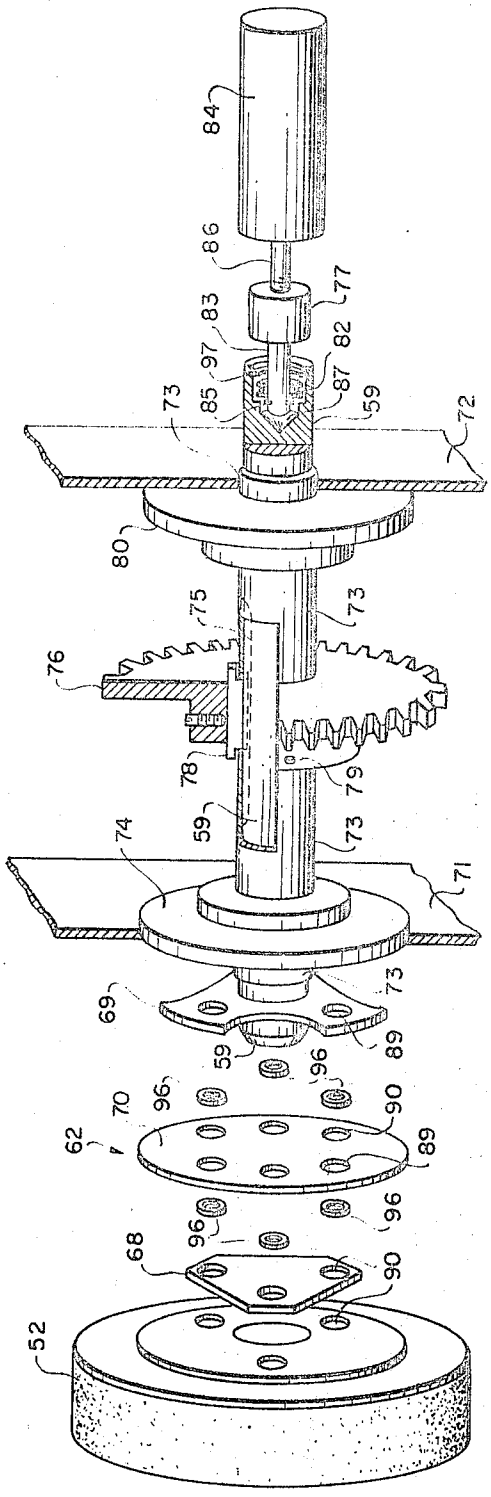


FIG. 8

INVENTOR.
JOSEPH P. ZACHEK
BY Dominik and Stein

ATTORNEYS

United States Patent Office 3,348,342 Patented Oct. 24, 1967

3,348,342

FINISHING MACHINE

Joseph P. Zachek, Hilbert, Wis. 54129

Filed July 22, 1964, Ser. No. 384,439
28 Claims. (Cl. 51—180)

The present invention relates to an apparatus for finishing the side wall surface or surfaces of elongated wall-like members.

The apparatus of the present invention is particularly applicable for finishing the side wall surface or surfaces of elongated wall-like members which are made of concrete or the like, such as concrete abutments, concrete wall and concrete railings. The apparatus is also equally applicable, with or without modifications, for finishing elongated wall-like members which are made of material other than concrete, as will be apparent from the detailed description which follows.

In the illustrative structure, the apparatus is shown and described as used for finishing the side wall surfaces of concrete railings, which may be the concrete railings constructed adjacent the roadbed of a bridge. Concrete railings of this type are generally constructed by pouring concrete into forms which define the outlines of the concrete railings, allowing the concrete to set up, and then removing the forms. When constructed in this, or a similar manner, the side walls lack a smooth exterior face and are characterized by small surface irregularities, such as small "pot" holes and the like.

In the past, these side walls were finished with smooth surfaces by manual labor. A crew of men armed with grout, grinding stones and other various implements would first patch the small "pot" holes and the like with the grout and then, using a single grinding stone, would grind the surfaces of the side walls to provide them with smooth, finished surfaces. The job is generally disliked, since it is hard, tedious work and, to a degree, a health hazard due to the resulting concrete dust. This process is also costly, in view of time required to complete a job and the high cost of labor. Furthermore, uniformity in finish is limited by human error, and gauged by eye and feel.

As an example of the latter, it has been found that it requires between 30–40 man-hours to finish approximately 250 feet of concrete railing, 18 to 21 inches in height. In other words, a crew of six to eight men, working for 5 hours.

With the device shown and described herein, this same job can normally be accomplished, using a crew of only three men, in approximately 4–5 hours. Or, in other words, in 12–15 man-hours. This therefore represents a savings of 18–25 man-hours, in finishing 250 feet of concrete railing.

In addition, the uniformity of operation inherent in the apparatus of the present invention can provide a finished surface which is comparable to, or better than, the finished surface normally provided by the manual labor.

It is therefore the principal object of this invention to provide improved apparatus for finishing the side wall surface or surfaces of elongated wall-like members.

It is a further object of this invention to provide improved apparatus for finishing the side wall surface or surfaces of elongated wall-like members which provides a savings in man-hours of 50–70 percent over doing the same job using manual labor. In this respect, it is a still further object to provide apparatus capable of providing a finished surface or surfaces which are comparable to, or better than, the finished surfaces normally provided by the manual labor.

It is a still further object to provide improved apparatus for finishing the side wall surface or surfaces of

elongated wall-like members which inexpensively manufactured and which may be easily transported.

It is a still further object to provide improved apparatus for finishing the side wall surface or surfaces of elongated wall-like members which may be operated by one man.

It is still another object to provide improved apparatus of the above type which is extremely versatile in that it may be used to finish the side wall surface or surfaces of elongated wall-like members which have side walls of various heights and widths, within predetermined limits.

It is still another object to provide improved apparatus of the above type which may be used to finish the side wall surface or surfaces of elongated wall-like members which have sloped side walls, as well as perpendicular side walls.

It is still another object to provide improved apparatus of the above type which is sturdy in construction, hence requiring a minimum amount of maintenance, and which is easily adjusted to finish the side wall surface or surfaces of elongated wall-like members having various heights, widths and vertically arranged walls.

It is still another object to provide apparatus of the above type which is self-propelled, either in the forward direction or the reverse direction, at selectable predetermined speeds, and which has provisions for free-wheeling whereby it may be quickly advanced from one position to another.

It is still another object to provide apparatus of the above type which is completely self-contained. In this respect, it is still another object to provide apparatus which uses only a single source of power for its entire operation.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the apparatus embodying features of construction, combinations of elements and arrangement of parts which are adapted to effect such steps, all as exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a front perspective view of a finishing machine exemplary of the present invention, shown positioned atop an elongated wall-like member;

FIG. 2 is a front view of the finishing machine of FIG. 1 shown positioned atop an elongated wall-like member having a sloped side wall;

FIG. 3 is a front view of the finishing machine of FIG. 1, shown modified in accordance with a second embodiment of the invention;

FIG. 4 is a front view of the finishing machine of FIG. 1 with its housing covers removed, and shown positioned atop an elongated wall-like member;

FIG. 5 is a top view of the finishing machine of FIG. 1;

FIG. 6 is a partial sectional view of the finishing machine of FIG. 1, taken along lines 6—6 in FIG. 5, with a number of its elements removed so as to more clearly disclose the construction thereof;

FIG. 7 is a diagrammatic view of the finishing machine of FIG. 1 taken substantially transversely through it, to illustrate the drive gear arrangement; and

FIG. 8 is an exploded view of the driving shaft and coupling arrangement for the grinding wheels of the finishing machine of FIG. 1.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring now to the drawings, in FIG. 1 a finishing

machine 10 exemplary of the present invention is shown positioned atop an elongated wall-like member 11, which for the purpose of illustrating the invention is referred to as a concrete railing 11. The source of power, the driving gears and the like, which are described in detail hereinafter, are substantially enclosed within a cover, or housing, to protect the same from damage and from the elements, as well as dirt and the like, which may interfere with its proper operation.

The illustrative finishing machine 10 in its entirety has two downwardly projecting housing assemblies 17 and 18 which are positioned to straddle the concrete railing 11. A driving wheel assembly 12 is positioned between the housing assemblies 17 and 18 and is arranged to transport the finishing machine 10 along the concrete railing, in either a forward or a reverse direction, at a selectable predetermined speed. Rotatably and slidably secured to the housing assemblies 17 and 18, respectively, are a number of grinding wheels, which grinding wheels are changeable in accordance with the particular type material being finished, which are yieldably engageable with the side wall surfaces of the concrete railing 11 to finish the same, as the finishing machine 10 is being driven along the concrete railing. Four guide wheel assemblies, such as guide wheel assemblies 214 and 215 (FIG. 7), each of which includes a wheel rotatably fixed within a bracket, such as the wheel 218 rotatably fixed within bracket 219, are secured to the housing assemblies 17 and 18, preferably so as to engage the concrete railing 11 near its upper half, to assist in balancing and guiding the finishing machine 10.

The housing assembly 18 is hinged and arranged to be tilted, so that concrete railings having a sloped side wall, as shown in FIG. 2, may be finished with the finishing machine 10. This adjustment, as will be explained in detail, is readily achieved.

Also, the finishing machine 10 may be adapted, as shown in FIG. 3, to finish only one side wall of an elongated wall-like member, by replacing the housing assembly 18 with a supporting wheel assemblage 220 which is arranged to support the finishing machine 10 atop the elongated wall-like member. The supporting wheel assemblage 220 is also useful when a wall or the like has been constructed in an evacuation and there is not sufficient space between the wall and the evacuation to allow one or the other of the housing assemblies to travel therein.

Referring now to FIGS. 4–8, the construction of the finishing machine 10 is shown in detail. As may be best seen in FIGS. 4–6, the finishing machine 10 has a generally rectangular shaped main frame 34. A pair of water tanks 19 and 20 are mounted on the top side of the main frame 34, at each of its ends. Positioned centrally between the water tanks 19 and 20, on the top side of the main frame 34, is a gasoline engine 36, a compressor 95 and a clutch assembly 39.

Secured beneath the main frame 34 and arranged to straddle the concrete railing 11, are two housing assemblies 17 and 18. The housing assemblies are adjustably secured to the main frame 34 by fastening means, such as the nuts and bolts 40 passed through elongated apertures 41 formed in the main frame 34. By loosening the fastening means 40, one or the other or both of the assemblies 17 and 18 may be spaced apart, within limits, to straddle concrete railings of various widths.

The housing assembly 18 is hinged to the main frame 34 by means of support bar 42 which extends transversely to the assembly 18. The support bar 42 has an adjustable assembly 44, including a bolt 46, an adjusting nut 48 and a lock nut 47, at its one end and a pivotal connection 45 at its opposite end. By loosening the lock nut 47 and turning the adjusting nut 48 in the proper direction, the lower end of the grinding wheel assembly 18 may be pivoted outwardly (as indicated by the dotted lines) at the pivotal connection 45, so that the housing assembly 18 may be used to finish the surface of a sloped side wall, as shown in FIG. 2. It is apparent that assembly 17 also could be arranged to be pivotal, if desired.

The grinding wheel housing assemblies 17 and 18 have grinding wheels 49–51 and 52–54 secured thereto, respectively, in a manner to be described more fully hereinafter. A pair of water supply lines 21 and 22 are arranged to supply water from the water tanks 19 and 20 to the grinding wheels connected with the housing assemblies 17 and 18, respectively. Each of the water supply lines 21 and 22 has a flow control valve 55 for controlling the amount of water delivered to the grinding wheels.

The water supplied to the grinding wheels serves to lubricate them, as the side wall surfaces of the concrete railing 11 are being ground. The water is also supplied in a controlled amount so that the grinding wheels produce a "slurry," or mixture of water and concrete dust. This "slurry" is advantageously used to fill the "pot" holes and the slight irregularities in the side wall surfaces to thereby provide a smoothly finished surface on the side walls, simultaneously with the grinding operation as the finishing machine is being driven along the concrete railing. In addition, by controlling the amount of water supplied to the grinding wheels and using it to form a "slurry," the dust which normally results when concrete or the like is being ground is substantially, if not entirely, eliminated. The previously existing health hazard is therefore eliminated, and, in addition, an air compressor may be used, which under normal circumstances would be rendered inoperative in a short time as a result of the dust collecting into its piston chamber. The value of the air compressor of the finishing machine 10 will be apparent from the description which follows.

From the above description, it may be noted that at least a four-fold function is accomplished with the finishing machine 10 through the cooperative operation of the grinding wheels and the manner in which water is supplied thereto, namely: lubrication of the grinding wheels; production of a "slurry" which can be used to fill the small "pot" holes and irregularities in the side wall surfaces; elimination of the concrete dust which constitutes a health hazard; and, as a result of the latter, the ability to use an air compressor. The advantages provided by these functions are apparent, or will be apparent from the following detailed description.

The grinding wheels 49–54 are coupled to the shafts 56–61, respectively, by means of flexible couplers, such as the flexible coupler 62, which may be best seen in FIG. 8. The flexible couplers each include, as may be seen by observing flexible coupler 62, a substantially Y-shaped connecting plate 69 which is fixedly secured to the end of the shaft 59, a triangular-shaped connecting plate 68 and a circular-shaped flexible member 70, which may be of a flexible material having a high resistance to tearing. The flexible member 70 is secured to the Y-shaped connecting plate 69 by means of bolts or the like passed through the apertures 89 formed in the flexible member 70 and the Y-shaped connecting plate 68. The triangular-shaped connecting plate is connected to the flexible coupler 70 and to the grinding wheel 52 by means of bolts or the like passed through the apertures 90. Spacers 96 are included between the respective surfaces of flexible member 70 and plates 68 and 69. It may be noted that the apertures 89 are angularly off-set from apertures 90 and are positioned beyond the edges of the triangular shaped connecting plate 68 and that the plate 68, therefore, is angularly off-set with the plate 69 so that the grinding wheel 52 is flexibly supported on the end of the shaft 59. With this arrangement, the grinding surface of the grinding wheels are held substantially flush against the surface of the concrete railing and follow the contour thereof.

A steel tubing 73, as may be seen in FIGS. 6 and 8, is extended through the side walls 71 and 72 of the housing assembly 18 and is rotatably supported therein by means of bearing retaining supports 74 and 80 secured

to the side walls 71 and 72, respectively. The shaft 59 is slidably supported within the tubing 73, and is extended beyond both ends thereof. A driving gear 76 coupled to the shaft 59 by means of a key 78 engaged with an elongated keyway 75 in shaft 59 is secured to tubing 73 and held in a central position between the side walls 71 and 72 by means of a set screw 79 or the like engaged with the tubing 73.

Connected exteriorly of the housing assembly 18 to the side wall 72 is a bracket 91 (FIG. 6) having a flexible end piece 92 for flexibly supporting an air cylinder 84. A piston 86 of the air cylinder 84 is connected to an adapter 77 which has a thrust bearing 82 rotatably secured to a shaft 83 thereof by means of a lock ring 85. The thrust bearing 82 is rotatably received within a cavity 87 formed in the end of the shaft 59, and is held therein by means of a lock ring 97. With this arrangement, the shaft 59 may move transversely to the housing assembly 18, in a manner to be described, and may rotate without rotating the piston 86 within the cylinder of the air cylinder 84.

The air cylinder 84 secured to the end of the shaft 59 is coupled by means of a T-shaped coupler 93 to a feed line 94, which extends from the compressor 95 secured to the top side of the main frame 34. The air cylinder 84, under the control of the air compressor 95, urges the piston 86 thereof against the end of the shaft 59 to slide the shaft 59 transversely to the housing assembly 18 to uniformly yieldably urge the grinding surface of the grinding wheel 52 against the surface of the concrete railing 11. The driving gear 76 being secured to the tubing 73 is maintained centrally positioned between the side walls 71 and 72 of the housing assembly 18 and the shaft 59 is therefore slidably received within the gear 76. For this reason, the keyway 75 is elongated and the key 78 slides therein so that the gear 76 is always rotatably fixed to the shaft 59. The keyway 75 is secured within the tubing 73 so that it is protected from dust or the like which may accumulate within the housing assembly 18.

The grinding wheel 52 is held at a fixed distance from the side wall 71 by the end of the tubing 73 enveloped about the shaft 59. The flexible end piece 92 on the bracket 91 acts as a shock absorber for the air cylinder 84 to protect the same from damage.

Each of the grinding wheels 49–51 and 53 and 54 are coupled to their respective shafts, and the shafts are slidably and rotatably retained within the housing assemblies 17 or 18, in the same above-described manner.

Referring now to FIGS. 6 and 7, the driving arrangement for the grinding wheels 49–51 and 52–54 coupled to the housing assemblies 17 and 18, respectively, can be seen. The gasoline engine 36 has two pulleys 104 and 106 connected to its drive shaft 103. The pulley 106 is coupled by a pulley belt 108 to a main drive pulley 109, secured to one end of a shaft 110. The shaft 110 extends through a rectangular shaped shaft support 111 and is rotatably secured therein by means of a pair of bearing assemblies 112 and 113. A gear 114 is secured to the opposite end of the shaft 110 and is coupled to a gear 118 by means of a chain 116. The gear 118 is fixedly secured to a shaft 120 extending transversely across the width of the grinding machine 10. The shaft 120 is rotatably secured within the housing assembly 17 by means of bearing assemblies 128 and 129 secured to the side walls 126 and 127, respectively, within the housing assembly 18 by means of bearing assemblies 124 and 125 secured to the side walls 171 and 172, respectively, and is centrally supported by means of a bearing assembly 122 secured and retained within the apertured plate 121 secured to the lower end of the shaft support 111 and depending downwardly therefrom.

A gear 130 is secured to the shaft 120 and is centrally disposed between the side walls 126 and 127 of the housing assembly 17. A similar gear 131 is likewise secured to the shaft 120 and is centrally disposed between the side walls 71 and 72 of the housing assembly 18. The gear 131, as may be best seen in FIG. 7, is drivingly coupled by means of a chain 132 to each of the gears 76, 101 and 102 connected to the shafts 59–61, respectively. The gear 130 secured to the shaft 120 within the housing assembly 17 is drivingly coupled to the shafts 56–58 of the grinding wheels 49–51, respectively, by means of a similar driving chain (the driving chains have been removed in FIG. 6, to clarify the drawing).

In operation, the gasoline engine 36, which may be a 7 HP gasoline engine, although engines having a smaller or larger rating may also be used, drives the main drive pulley 109 coupled thereto by means of the pulley belt 108. The main drive pulley 109, in turn, rotates the shaft 110 to which it is connected, hence the gear 114 connected to the opposite end thereof is likewise rotated. The gear 114 being coupled by means of the chain 116 to the gear 118 rotates the shaft 120 to which it is connected. Since the shaft 120 is rotated, gears 130 and 131 within the housing assemblies 117 and 118, respectively, are likewise rotated to drive the shafts 56–58 and 59–61 by means of the chain driving connection, such as the chain 132 which couples the gears 131, 76, 101 and 102 secured within the housing assembly 18. The above described driving arrangement is preferably geared so as to have a ratio such that the grinding wheels 49–51 and 52–54 connected to the housing assemblies 17 and 18, respectively, are driven at a rotational speed of approximately 80 revolutions per minute.

A universal joint 100 is provided in the shaft 120 so that the housing assembly 18 may be tilted, in the manner previously described, without damaging the shaft 120. The universal joint 100 is also expandable, by having the ends of the shaft 120 slidably journaled therein, so that the housing assemblies may be spaced apart, at various distances, without having to add couplers of some type to the shaft 120.

In referring to FIG. 7, it may be noted that the axles 59–61, and hence grinding wheels 52–54, are triangularly positioned within the housing assembly 18. Also, the axles 59–61 are positioned with respect to one another so that the grinding wheels slightly overlap one another so that the entire surface of the concrete railing 11 is ground. The grinding wheel 52, as shown, is an 8″ grinding wheel while the grinding wheels 53 and 54 are both 6″ grinding wheels. The shafts 56–58, and hence the grinding wheels 49–51, are arranged within the housing assembly 17 in the same manner. Also, the grinding wheels 49 and 51 are the same size as grinding wheels 52–54, respectively. With this arrangement, a concrete railing approximately 18″ in height can be smoothly finished.

Concrete railings having a height up to approximately 21″ can be finished with the arrangement shown by longitudinally adjusting the position of the shafts 58 and 61 within the elongated apertures formed in the side walls of the housing assemblies 17 and 18 and by replacing the 6″ grinding wheels with 8″ grinding wheels. It should be apparent, however, that concrete railings having even a greater height than 21″ may be finished by merely rearranging the position of the shafts supporting the grinding wheels and by using larger size grinding wheels.

A chain tightening assembly 132 and 141 is provided in each of the housing assemblies 17 and 18 so that the same driving chain, such as the driving chain 132, may be used when the longitudinal position of the shafts 58 and 61 are adjusted, without having to remove or add links to the chains. The chain tightening assembly 132 includes a shaft 133, which may be best seen in FIG. 7, movably secured within elongated apertures 140 formed in the side walls 71 and 72 of the housing assembly 18. A gear 134 secured thereto is centrally disposed within the housing assembly 18 in line with the gears 76, 101 and 102 by means of spacers 136 and 138. When the longitudinal position of the shaft 61 is adjusted the longitudinal position of the shaft 133 is likewise adjusted to

compensate for the change and to keep the chain **132** firmly engaged with the gears **131**, **76**, **101** and **102**. The chain tightening assembly **141** secured within the housing assembly **17** is constructed and is adjusted in the same manner as the chain tightening assembly **132**, when the longitudinal position of the shaft **58** is adjusted.

As previously stated, the air cylinders, such as air cylinder **84**, coupled to the ends of the shafts **56–61** uniformly yieldably urged the grinding wheels **49–54** against the surfaces of the concrete railing **11**. The air pressure for activating the air cylinders is provided by the compressor **95**, the output of which is uniformly coupled in equal amount to each of the air cylinders secured to the ends of the shafts **59–61** by means of the feed line **94** and the couplers **93**, **142** and **143** and to each of the air cylinders secured to the shafts **56–58** by means of the feed line **144** and the couplers **145–147**. The air compressor **95** has a pulley **148** which is coupled by means of a pulley belt **149** to a pulley **104** secured to the drive shaft **103** of the gasoline engine **36**. The air compressor **95** preferably delivers a pressure of at least 20 p.s.i. to the air cylinders, since this value has been found to provide satisfactory results. A flow control valve **28** and a pressure gauge **29** is included in the supply line from the air compressor **95**, for regulating the air pressure accordingly.

A driving wheel assembly **12** is secured beneath the main frame **34**, between the housing assemblies **17** and **18**. The center of gravity of the finishing machine **10** is preferably located over the axis of the driving wheel assembly **12**, so that the finishing machine **10** is substantially balanced on the driving wheel assembly **12** when it is positioned atop the concrete railing **11**, as shown in FIG. 4.

The driving wheel assembly **12**, as may be best seen in FIGS. 6 and 7, has four axles **150–153**, each of which has two driving wheels, such as driving wheels **154** and **155** connected to axle **153**, rotatably secured thereto, in spaced relation so as to ride atop the concrete railing **11**. The axles **150–153** are rigidly secured to a housing assembly **156** by means of bearing retaining plate members, such as the bearing retaining plate member **158** secured to the housing assembly **156** by means of screws **159** and **160** or the like. Also, secured to the axles **150–153** are gears **161–164** for driving the wheels of the driving wheel assembly **156**. In order to provide a uniform drive, gears **161** and **164** and gears **162** and **163** are preferably secured to their respective axles, on opposite sides of the housing assembly **156**. As will be explained more fully hereinafter, the axle **153** is driven by means of a gear reduction assembly **166** coupled thereto, and drives the rest of the axles **150–152**, and hence the finishing machine **10**. The gear reduction assembly **166** may have a gear reduction ratio of 50:1, and with this ratio the finishing machine may be driven along the concrete railing **11** at a speed of between approximately 1 foot per minute to 2 feet per minute, depending on the speed selected, in the manner to be described.

The driving wheel assembly **156** is pivotally connected to the main frame **34** of the finishing machine **10** by means of the pivotal connecting brackets **168** and **169**. The connecting bracket **169** has a substantially semi-circular member **170** secured thereto, which is engaged by the end of a shaft **171** threadably received in a shaft retainer **172**. The opposite end of the shaft **171** has a wheel **173**, similar to a steering wheel, secured thereto. By rotating the wheel **173**, the shaft **171** may be threaded through the shaft retainer **172** to bear upon the member **170**, which action is effective to cause the connecting bracket **169** to be pivoted to lower the driving wheel assembly **156**. Rotating the wheel **173** in the opposite direction will cause the driving assembly to be raised. With this arrangement, the finishing machine **10** can be placed upon a concrete railing **11** with the driving wheel assembly lowered, and then the height thereof adjusted until the grinding wheels **149–154** secured to the housing assemblies **17** and **18** are properly positioned for finishing the side wall surfaces of the concrete railing **11**.

The driving wheel assembly **156** for the finishing machine **10** is drivingly coupled to the gasoline engine **36**, and is driven thereby, through a clutching and gearing arrangement, which may be best seen in FIGS. 5, 6 and 7. A gear **174** (FIG. 6) connected to the shaft **110**, which shaft also has the main driving pulley **109** secured thereto, is centrally disposed between the side walls of the shaft support **111**. The gear **174** is coupled by means of a chain **178** to a gear **176** secured to a shaft **180**, which is rotatably secured within bearing assemblies **181** and **182** connected to the side walls of the shaft support **111**. A coupler **186** having a circular clutch plate **184** secured thereto is slidably received on one end of the shaft **180**. Between the coupler **186** and the bearing assembly **181** is a spring **191** which resiliently urges the coupler **186**, and hence the clutch plate **184**, against the peripheral edge of a friction plate **198**. The friction plate **198** preferably has a rubber coating **99** or the like about its peripheral edge so as to frictionally engage the clutch plate **184**.

The friction plate **198** is slidable on a splined shaft **192** secured within a U-shaped shaft support member **197** (FIG. 7) by means of bearing assemblies **193** and **194** secured to the end walls **195** and **196**, respectively, thereof. Secured to the end of the shaft **192** is a gear **200** which is coupled by means of a chain **201** to a gear **202**. The gear **202** is, in turn, connected to the end of a shaft **206** rotatably secured within the shaft support **204** connected to the main frame **34** of the finishing machine **10**. The shaft **206** is connected on its other end to the gear reduction assembly **166**.

In operation, the shaft **110** is rotated by means of the pulley **109**, which is coupled to the pulley **106** secured to the drive shaft **103** of the gasoline engine **36**. The gear **174** being coupled to the gear **176**, by means of the chain **178**, causes the shaft **180** and hence the clutch plate **184** to be rotated. The rotation of the clutch plate **184** is transferred to the shaft **192** through the medium of the friction plate **198** which has its peripheral edge frictionally engaged with the clutch plate **184**. The gear **200** secured to the end of the shaft **192** is therefore rotated and rotates, by means of the chain **201**, the gear **202** which is secured to the one end of the shaft **206**. The shaft **206** is coupled to the gear reduction assembly **166** which is, in turn, coupled to the axle **153**, hence the gear **164** secured to the axle **153** is rotated to drive the driving wheel assembly **156**.

The above described clutching arrangement is arranged to provide a neutral and three selectable speeds, in either a forward or reverse direction. This is accomplished by adjusting the position of the friction plate **198** with respect to the clutch plate **184**, by means of a rod **209** coupled to the friction plate **198**. As may be best seen in FIG. 5, one end of the rod **209** is positioned within an elongated aperture **211** formed in a selector plate **210** connected to the main frame **34** of the finishing machine **10**. The elongated aperture **211** in the selector plate **210** has a notch **212** defining a neutral position and three notches defining three forward speeds to one side thereof and three notches defining three reverse speeds to the other side thereof. The end of the rod **209** is adjusted within the elongated slot **211** to position the friction plate **198** to the right or to the left of the axis of the clutch plate **184**, or to center the friction plate adjacent to the axis of the clutch plate **184**. The center portion about the axis of the clutch plate **184** is dished so that the friction plate **198** does not engage the clutch plate when the friction plate **198** is positioned adjacent the axis of the clutch plate **184**. This provides the neutral position for the finishing machine **10**, and the end of the rod **209** is accordingly arranged to be positionable within the notch **212** in the speed selector plate **210**. When the friction

plate **198** is positioned to engage the clutch plate **184** to the right of the axis of the clutch plate **184**, as shown in FIG. 5, and the end of the rod **209** is engaged in a notch forward (as shown) of notch **212**, the finishing machine **10** will be transported in a forward direction. Correspondingly, when the friction plate **198** is positioned to engage the clutch plate **184** to the left (as shown) of the axis of the clutch plate **184**, machine **10** is transported in a reverse direction. When the friction plate **198** is positioned in the last described position, the end of the rod **209** is engaged in one or the other of the notches aft of the notch **212** in the speed selector plate **210**.

To change speeds, or the direction of travel, of the finishing machine **10**, the lever arm **190** connected to the coupler **186** is pushed towards the left (as shown in FIG. 5). Since the lever arm **190** and the coupler **186** are pivotally connected by means of a pivot pin **189** to the member **188**, the coupler **186** will be slidably urged on the shaft **110** to bear against the spring **191** and to disengage the clutch plate **184** from the friction plate **198**. While the clutch plate **184** is disengaged, the knob **213** secured to the end of the rod **209** is moved to the left to disengage the end of the rod from the notches in the selector plate **210** and then moved either fore or aft, depending on the speed and the direction of travel desired, so that the friction plate **198** is properly positioned to engage the clutch plate **184** to cause the machine **10** to travel in the proper direction, at the proper speed. The lever arm **190** is then released and the spring **191** will resiliently urge the coupler **186**, and hence the friction plate **184**, to again engage the friction plate **198**.

It is frequently desired to transport the finishing machine **10** from one position to another on the concrete railing **11** at a faster rate of travel than that provided by the driving arrangement described above. The finishing machine **10** can be "free wheeled" in a rapid manner by merely removing a key **228** which couplingly engages the gear reduction assembly **166** with the shaft **153**. Therefore, by removing the key **228**, the finishing machine **10** may be rapidly transported from one position to another on the concrete railing **11** and the key **228** then replaced to reengage the driving mechanism so that the finishing machine driven, as previously described.

As previously stated, the driving assembly **156** may be raised or lowered by turning the wheel **173** in the proper direction. For this reason the shaft **206** which drivingly couples the gear reduction assembly **166** to the gear **102** includes a universal joint **208** so that the driving assembly **156** may be raised or lowered in this fashion, without damaging the shaft **206**. For even greater flexibility a second universal joint **208'** may be connected at the opposite end of the shaft **206**, as shown in FIG. 7.

A pulley engaging assembly **221** including a pulley retaining plate **222** having pulleys **223** and **224** rotatably secured thereto, a lever arm **225** and a bracket **226** secured to the main frame **34** of the finishing machine **10** for supporting the pulley retaining plate **222**, is provided for operatively engaging the pulley belts **108** and **149** with the pulleys **106** and **109**, and **104** and **148**, respectively. The pulley retaining plate **222** is pivotally connected to the bracket and arranged in an off-set fashion so that the pulleys **223** and **224** engage the pulley belts **108** and **149**, respectively, when the lever arm **225** is pulled towards the front of the finishing machine **10**, and will be held in engagement therewith until the lever arm is pushed towards the rear of the finishing machine. The gasoline engine **36** can therefore be effectively disconnected from the driving arrangements described above, before it is started.

As previously indicated, the housing assembly **18** may be replaced with a supporting wheel assemblage **220**, in the event only one surface of an elongated wall-like member is to be finished, or when there is not sufficient room for the housing assembly **18** to be used. The supporting wheel assemblage **220** has apertures (not shown) formed in a connecting member **230** arranged to receive the bolts **40**, so that the bolts **40** extend through the elongated apertures **41** formed in the main frame **34**. It may therefore be noted that the supporting wheel assemblage **220** is secured to the main frame **34**, in the same manner using the same bolts **40** and apertures **41** used to secure the housing assembly **18** to the main frame so that the main frame does not have to be modified to receive the same.

The supporting wheel assemblage **220** also has a pair of guide wheel assemblies, such as the guide wheel assembly **231**, which may be of the same type as the guide wheel assemblies **214** and **215**, secured to its opposite side walls. The guide wheel assemblies are arranged to ride along the side wall surface to support and to balance the finishing machine **10**, in the same manner as guide wheel assemblies **214** and **215**.

The flexible couplers **62–67** coupling the grinding wheels **49–54** to the shafts **56–61**, respectively, are particularly valuable when using the supporting wheel assemblage **220** in maintaining the grinding surface of the grinding wheel flush against the side wall surfaces. It may be noted that the guide wheel assemblies **231** and **232** will follow the contour of the side wall surface and that the finishing machine **10** may therefore be tilted, slightly, from side to side of the concrete railing **11** as it is driven along the concrete railing. In such cases, if the grinding wheels were rigidly coupled to the shafts, the grinding surface of the grinding wheels would not be uniformly forced against the side wall surface and ridges or the like would be ground therein. Being flexibly coupled to the shafts, however, the grinding surface of the grinding wheels are held flush against the side wall surface and will follow its contour, hence the chance of this undesirable result occurring is substantially, if not completely, eliminated.

The numerous features and advantages of the finishing machine **10** in finishing the side wall surfaces of concrete railings are apparent from the above detailed description of its construction and its operation. It is also apparent from this detailed description that the finishing machine **10** may be used for finishing the surface or surfaces of other types of elongated wall-like members which are made of concrete, such as the side walls of swimming pools, the side walls of storage basins in sewage disposal plants; provided the elongated wall-like member is sufficiently strong to support the finishing machine.

The finishing machine **10** may also be used to "plaster," or finish, the surfaces of walls built of cement blocks or the like. In this respect, the excess mortor used to bind the cement blocks or the like together is not removed, in fact, an excessive amount is desired, so that a sufficient "slurry" is formed, in the manner described above, to, in effect "plaster" the surface of the cement blocks, as the finishing machine **10** is driven along the top thereof.

It is not intended that the finishing machine **10** be limited to finishing the side wall surface or surfaces of elongated wall-like members having a height of 21 inches, since it is readily apparent that the housing assemblies **17** and **18** can be easily lengthened, and a corresponding number of grinding wheels, and the mechanism associated therewith, added.

It is also apparent that the finishing machine **10** can be used to finish side walls constructed of, for example, wood or any other type of material which may be finished by polishing, sanding or the like. The grinding wheels **49–54** are merely replaced wheels, sanding wheels or the like, as required for the particular job at hand.

The machine, according to the present invention, operates to finish a surface, or surfaces, as follows: The overall surface, or surfaces, to be finished are ground at one time with grinding means while the grinding means are simultaneously being advanced over the surface, or surfaces. In cases where the surface, or surfaces, being finished is concrete or the like, water is dripped onto the

grinding means. The grinding means are uniformly yieldably urged against the surface, or surfaces concurrent with regulated wetting of removed particles to form a slurry in intimate contact with the ground surface, or surfaces.

In cases where the surface, or surfaces, being finished is of a material such as wood or the like, the dripping water onto the grinding means is eliminated. The operation of the machine in such case is therefore as follows: grinding the overall surface, or surfaces, to be finished at one time, while simultaneously advancing the grind means and uniformly yieldably urging the grinding means against the surface, or surfaces.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in carrying out the above method and in the construction set forth without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

Now that the invention has been described, what is claimed as new and desired to be secured by Letters Patent is:

1. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame in spaced relation so as to straddle a wall, each of said housing assemblies having finishing means attached thereto for finishing at least one of said surfaces; a driving assembly adjustably mounted beneath said frame between said housing assemblies, said driving assembly being arranged to ride on a top surface of said wall and being adjustable to positionally raise and lower said housing assemblies with respect to said top surface; and drive means coupled to both said finishing means and said driving assembly for operating them to finish said surface and to convey said apparatus.

2. Apparatus, as claimed in claim 1, wherein said pair of housing assemblies are adjustably secured beneath said frame and are adjustable to straddle walls of various widths.

3. Apparatus, as claimed in claim 1, wherein at least one of said housing assemblies is hinged beneath said frame and arranged to be tilted to finish walls having a sloped side wall.

4. Apparatus, as claimed in claim 1, wherein at least one of said finishing means is adjustably attached to said housing assemblies and is arranged to be adjusted to finish surfaces of walls of various heights.

5. Apparatus, as claimed in claim 1, wherein said driving assembly is arranged to drive said apparatus forwardly and rearwardly, at a selectable speed, and has a neutral position.

6. Apparatus, as claimed in claim 5, wherein said driving apparatus is disengageable so that said apparatus may be free-wheeled.

7. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame and arranged to be adjusted to a predetermined spaced relation so as to straddle a wall, at least one of said housing assemblies being pivotally connected to said frame so as to be tiltable, each of said housing assemblies including at least one shaft rotatably secured thereto; finishing means coupled to one end of said shaft and arranged to be rotated; and a driving assembly mounted beneath said frame said housing assemblies and arranged to ride on a top surface of said wall.

8. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame and arranged to be adjusted to a predetermined spaced relation so as to straddle a wall, at least one of said housing assemblies being pivotally connected to said frame so as to be tiltable, each of said housing assemblies including a plurality of shafts, retaining means for rotatably securing said shafts in said housing assemblies, said retaining means being adjustable to vary the position of said shafts; gear means secured to each of said plurality of shafts, and driving means coupled to each of said gear means; finishing means secured to one end of each of said plurality of shafts; and a driving assembly mounted beneath said frame between said housing assemblies and arranged to ride on a top surface of said wall.

9. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame in spaced relation so as to straddle a wall, each of said housing assemblies including a plurality of shafts, each rotatably and slidably secured thereto; driven means secured to each one of said plurality of shafts, and driving means coupled to each of said driven means; finishing means coupled to one end of each of said plurality of shafts; actuated means coupled to the opposite ends of each plurality of shafts for slidably urging and yieldably maintaining said finishing means in engagement with said side wall surfaces; actuating means coupled to each of said actuated means; and a driving assembly adjustably mounted beneath said frame between said housing assemblies and arranged to ride on a top surface of said wall.

10. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame and arranged to be adjusted to a predetermined spaced relation so as to straddle a wall, at least one of said housing assemblies being pivotally connected to said frame so as to be tiltable, each of said housing assemblies including a plurality of shafts, each rotatably and slidably secured thereto; driven means secured to each one of said plurality of shafts, and driving means coupled to each of said driven means; finishing means coupled to one end of each of said plurality of shafts; actuated means coupled to the opposite ends of each plurality of shafts for slidably urging and yieldably maintaining said finishing means in engagement with said side wall surfaces; actuating means coupled to each of said actuated means; and a driving assembly adjustably mounted beneath said frame between said housing assemblies and arranged to ride on a top surface of said wall.

11. Apparatus for finishing the side wall surface of walls comprising, in combination: a frame; at least one housing assembly secured beneath said frame, said housing assembly including at least one shaft rotatably secured thereto; finishing means secured to said shaft; a driving assembly adjustably mounted beneath said frame, said driving assembly being arranged to ride along a top surface of said wall and being adjustable to positionally raise and lower said housing assembly with respect to said top surface of said wall.

12. Apparatus for finishing the side wall surface of walls comprising, in combination: a frame; a housing assembly secured beneath said frame having a plurality of shafts rotatably secured thereto; finishing means secured to one end of each of said plurality of shafts; driving means coupled to said shaft for rotating said shafts; and a driving assembly adjustably mounted beneath said frame beneath said housing assemblies, said driving assembly being arranged to ride on a top surface of said wall and being adjustable to positionally raise and lower said housing assembly with respect to said top surface of said wall, said driving means also being drivingly coupled to said driving assembly.

13. Apparatus for finishing the side wall surfaces of

walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame and arranged to be adjusted to a predetermined spaced relation so as to straddle a wall, each of said housing assemblies including a plurality of shafts, each rotatably and slidably secured thereto; finishing means to one end of each of said plurality of shafts; means coupled to each of said plurality of shafts for rotating said shafts; a driving assembly adjustably mounted beneath said frame between said housing assemblies and arranged to ride on a top surface of said wall, said driving assembly including a plurality of axles in spaced relation, each having a pair of driving wheels and gear means secured thereto, coupling means between predetermined pairs of said gear means, and driving means secured to at least one of said axles; and a source of power coupled to said driving means.

14. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame and arranged to be adjusted to a predetermined spaced relation so as to straddle a wall, each of said housing assemblies including a plurality of shafts, each rotatably and slidably secured thereto; finishing means coupled to one end of each of said plurality of shafts; means coupled to each of said plurality of shafts for rotating said shafts; a driving assembly adjustably mounted beneath said frame between said housing assemblies and arranged to ride on a top surface of said wall; a source of power; and coupling means coupling said source of power to said driving assembly, said coupling means being arranged to couple said source of power to said drive assembly to selectively drive said apparatus in a forward and a reverse direction, at a selectable predetermined speed.

15. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame and arranged to be adjusted to a predetermined spaced relation so as to straddle a wall, each of said housing assemblies including a plurality of shafts, each rotatably and slidably secured thereto; finishing means coupled to one end of each of said plurality of shafts; shaft driving means secured to each of said plurality of shafts for rotating said shafts; an air cylinder coupled to the opposite end of each of said plurality of shafts for slidably urging and resiliently maintaining said finishing means in engagement with said side wall surfaces; an air compressor secured to said frame and coupled to each of said air cylinders for activating said air cylinders; a driving assembly adjustably secured beneath said frame between said housing assemblies and arranged to ride on a top surface of said wall; a source of power secured to said frame; and means coupling said source of power with said shaft driving means, said air compressor and said driving assembly, for operating the same, whereby only a single source of power is required for operating and for driving said apparatus.

16. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame and arranged to be adjusted to a predetermined spaced relation so as to straddle a wall, each of said housing assemblies including a plurality of shafts, each rotatably and slidably secured thereto; finishing means coupled to one end of each of said plurality of shafts; driving means coupled to said plurality of shafts for rotating said shafts; an air cylinder coupled to the opposite end of each of said plurality of shafts for slidably urging and resiliently maintaining said finishing means in engagement with said side wall surfaces; an air compressor secured to said frame and coupled to each of said air cylinders for activating said air cylinders; a source of power secured to said frame and drivingly coupled to said air compressor; and a driving assembly adjustably mounted beneath said frame between said housing assemblies and arranged to ride on a top surface of said wall.

17. Apparatus, as claimed in claim **16**, wherein said air cylinders include a piston secured within a cylinder, and wherein said pistons are coupled to the ends of said shafts by bearing means arranged to prevent said pistons from rotating within said cylinders, as said shafts are rotated.

18. Apparatus, as claimed in claim **16**, wherein said air cylinders are supported by bracket means secured to said housing assemblies, said brackets having flexible means, said air cylinders being secured to said flexible means and said flexible means functioning as shock absorbers to protect said air cylinders from being damaged.

19. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame and arranged to be adjusted to a predetermined spaced relation so as to straddle a wall, each of said housing assemblies including a plurality of shafts, each rotatably and slidably secured thereto; shaft driving means coupled to said plurality of shafts; finishing means secured to one end of each of said plurality of shafts; a driving assembly adjustably mounted beneath said frame between said housing assemblies, said driving assembly being arranged to ride on a top surface of said wall and being adjustable to positionally raise and lower said housing assemblies with respect to said top surface; a source of power secured to said frame; coupling means for coupling said source of power to said shaft driving means to operate said shaft driving means to rotate said shafts; and coupling means for coupling said source of power to said driving assembly to operate said driving assembly to drive said apparatus.

20. Apparatus, as claimed in claim **19**, wherein said source of power is a gasoline engine.

21. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame and arranged to be adjusted to a predetermined spaced relation so as to straddle a wall; each of said housing assemblies including a plurality of shafts, each rotatably and slidably secured thereto; finishing means coupled to one end of each of said plurality of shafts; driving means coupled to said plurality of shafts for rotating said shafts; storage means secured to said frame for storing water; supply lines connected to said storage means for supplying water to said finishing means; flow control means included in said supply lines for controlling the flow of water to said finishing means; and a driving assembly adjustably mounted beneath said frame between said housing assemblies and arranged to ride on a top surface of said wall.

22. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame and arranged to be adjusted to a predetermined spaced relation so as to straddle a wall, at least one of said housing assemblies being pivotally connected to said frame so as to be tiltable, each of said housing assemblies including a plurality of shafts, each rotatably and slidably secured therein; driven means secured to each one of said plurality of shafts, and driving means coupled to each of said driven means; finishing means coupled to one end of each of said plurality of shafts; actuated means coupled to the opposite end of each of said plurality of shafts for slidably urging and resiliently maintaining said finishing means in engagement with said side wall surfaces; actuating means coupled to each of said actuated means; and a driving assembly adjustably mounted beneath said frame between said housing assemblies and arranged to ride on a top surface of said wall.

23. Apparatus, as claimed in claim **22**, wherein said finishing means are coupled to said shafts by means of flexible couplers including a first plate means secured to

the end of a shaft, a second plate means secured to a finishing means and a flexible member, said first and second plate means being secured to and supported by said flexible member.

24. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame, a pair of housing assemblies secured beneath said frame and arranged to be adjusted to a predetermined spaced relation so as to straddle a wall, each of said housing assemblies including a plurality of shafts rotatably and slidably secured thereto in a predetermined spaced relation, at least one of said shafts being longitudinally adjustable; gear means secured to each of said plurality of shafts, driving means for rotatably driving said gear means in each of said housing assemblies, coupling means for coupling said driving means and said gear means; adjustable means in each of said housing assemblies included in said coupling between said driving means and said gear means, said adjustable means being arranged to compensate for the change in said coupling means when said shaft is adjusted longitudinally so that the same coupling means may be used; and a driving assembly adjustably mounted beneath said frame between said housing assemblies and arranged to ride on a top surface of said wall.

25. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame in spaced relation so as to straddle a wall, at least one of said housing assemblies being hinged to said frame and arranged to be tilted; each of said housing assemblies having a plurality of shafts rotatably and slidably secured thereto; gear means secured to each of said shafts and disposed with the respective housing assemblies; a driving shaft transversely disposed with said apparatus and extended into each of said housing assemblies, said driving shaft including joint means to allow said driving shaft to be angularly positioned when said one housing assembly is tilted; drive gear means disposed on opposite ends of said driving shaft and coupled to said gear means within the respective housing assemblies; means coupled to said driving shaft for rotating said driving shaft; and a driving assembly adjustably mounted beneath said frame between said housing assemblies and arranged to ride on a top surface of said wall.

26. Apparatus, as claimed in claim 25, wherein said housing assemblies are adjustably secured to said frame to allow said housing assemblies to be spaced apart to straddle elongated members of various widths, and wherein said ends of said driving shaft are slidably retained within said joint means so that said housing assemblies may be spaced apart without the need for additional coupling means.

27. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame in spaced relation so as to straddle a wall, each of said housing assemblies having a plurality of shafts coupled thereto; driving means coupled to said shafts for rotating said shafts; finishing means coupled to one end of each of said shafts; a driving assembly adjustably mounted beneath said frame between said housing assemblies; a clutch assemblage including a circular clutch plate secured to a shaft for rotation, a circular friction plate secured to a shaft for rotation having its peripheral edge engaged with said clutch plate and arranged to be rotated by said clutch plate, means for disengaging said clutch plate from said friction plate and means for positioning said friction plate to engage the peripheral edge thereof with a predetermined portion of said clutch plate; means coupling said friction plate shaft to said driving assembly for driving said assembly; and means coupled to said clutch plate shaft for rotating the same.

28. Apparatus for finishing the side wall surfaces of walls comprising, in combination: a frame; a pair of housing assemblies secured beneath said frame in spaced relation so as to straddle a wall, each of said housing assemblies having a plurality of shafts rotatably secured thereto; finishing means coupled to one end of each of said plurality of shafts; driving means coupled to said plurality of shafts for rotating said shafts; a driving assembly beneath said frame between said housing assemblies; at least two pivotal connecting means securing said driving assembly to said frame; shaft means rotatably secured to said frame and engaged with one of said pivotal connecting means for causing said pivotal connecting means to pivot to raise and lower said driving assembly; and means secured to said shaft means for rotating said shaft means.

References Cited

UNITED STATES PATENTS

1,044,423	11/1912	Rosa	51—180
1,176,262	3/1916	Zoboli et al.	51—180
1,647,499	11/1927	Bly	51—104.04 X
1,947,286	2/1934	Bitterbaum	51—180
2,075,369	3/1937	Stetler	51—170 X
2,631,315	3/1953	Hauser	15—104.04

LESTER M. SWINGLE, *Primary Examiner.*