Feb. 24, 1970 F. A. OSWALD 3,496,681

FLOOR GRINDING MACHINE

Filed Nov. 16, 1965 3 Sheets-Sheet 1

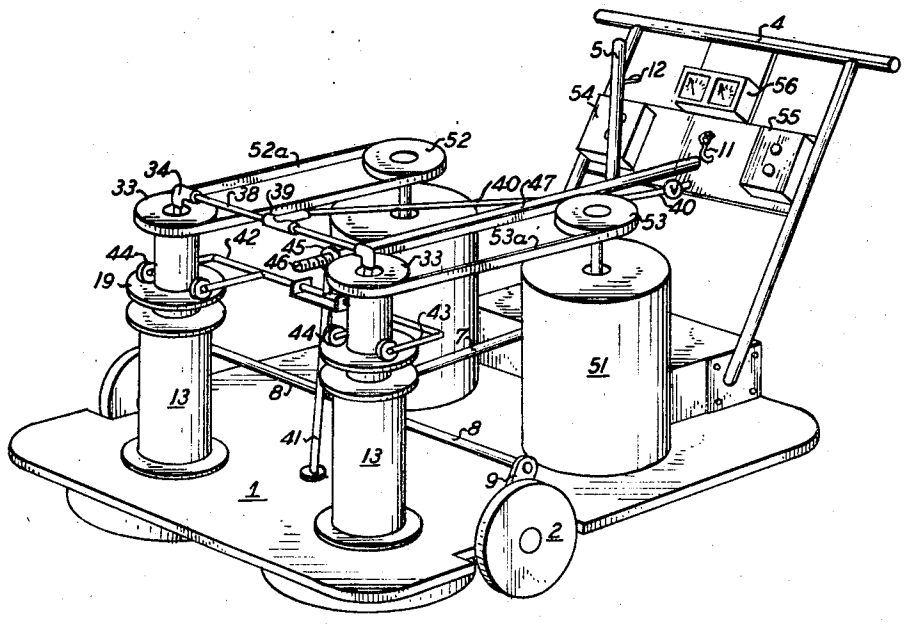


Fig. 1

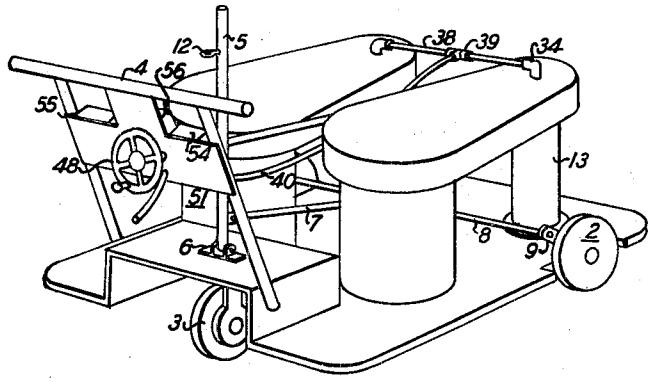


Fig. 2

INVENTOR.
FRED A. OSWALD
BY

Burgess Dinklage & Sprung
ATTORNEYS

Feb. 24, 1970 F. A. OSWALD 3,496,681

FLOOR GRINDING MACHINE

Filed Nov. 16, 1965 3 Sheets-Sheet 2

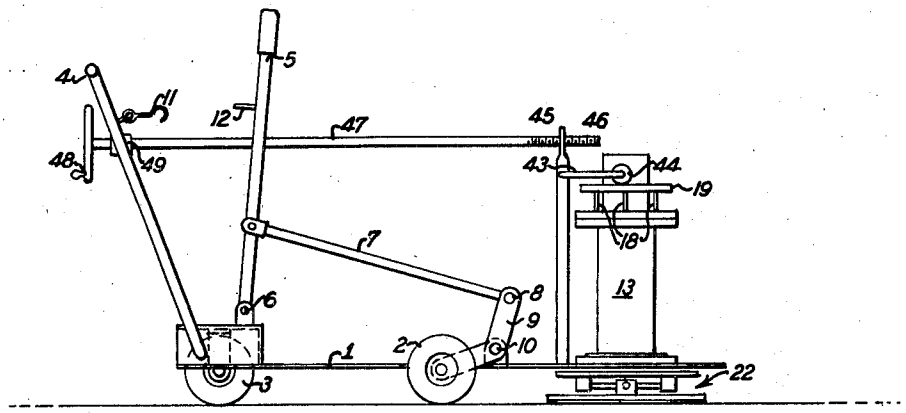


Fig. 5

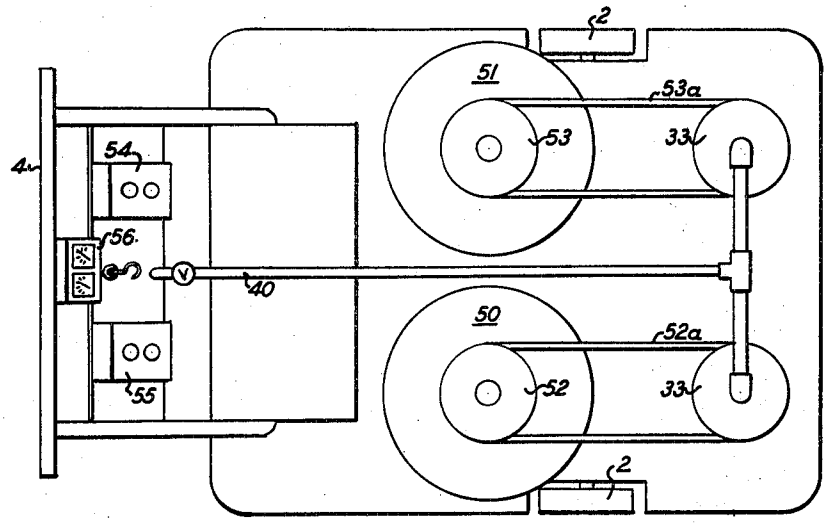


Fig. 6

INVENTOR
FRED A. OSWALD
BY

Burgess Dinklage & Sprung
ATTORNEYS

Feb. 24, 1970 F. A. OSWALD 3,496,681

FLOOR GRINDING MACHINE

Filed Nov. 16, 1965 3 Sheets-Sheet 3

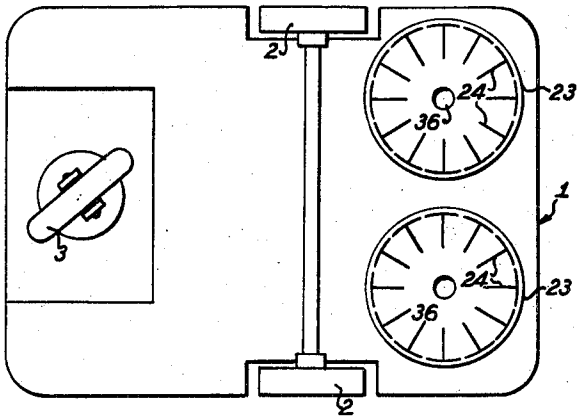


Fig. 5

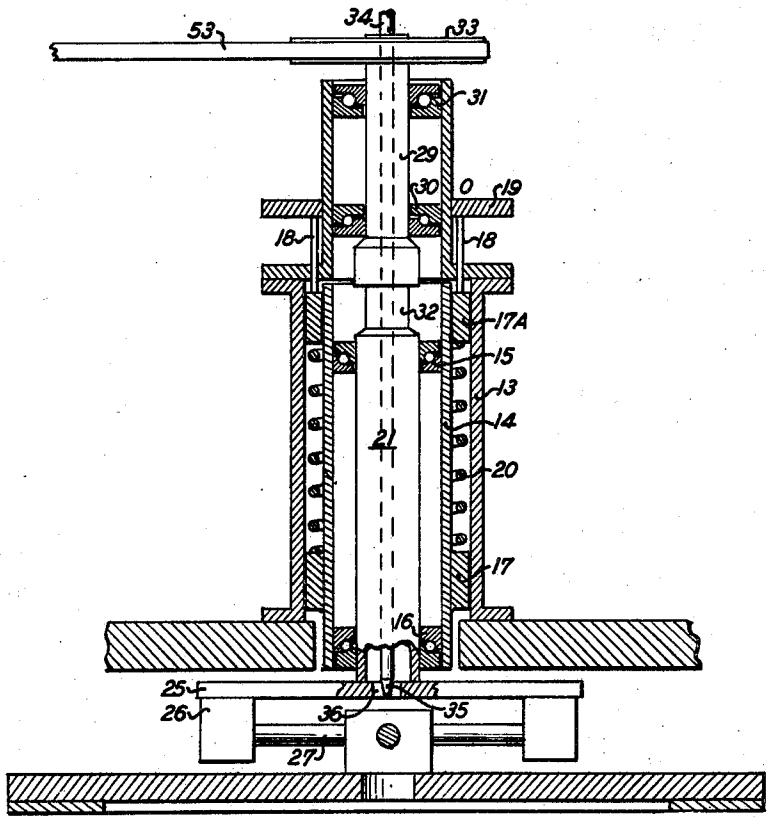


Fig. 4

INVENTOR.
FRED A. OSWALD
BY

Burgess, Dinkler & Sprung
ATTORNEYS

United States Patent Office 3,496,681 Patented Feb. 24, 1970

3,496,681

FLOOR GRINDING MACHINE

Fred A. Oswald, 50—17 47th Ave., Woodside, N.Y. 11377

Filed Nov. 16, 1965, Ser. No. 508,079
Int. Cl. B24b 23/00; A47l 11/00
U.S. Cl. 51—177 7 Claims

ABSTRACT OF THE DISCLOSURE

A floor grinding machine having a vertically oriented rotary drive shaft with means to axially urge the shaft downwardly. The urging means being adjustable to control the pressure of the grinding means against the floor.

This invention relates to a floor grinding machine. The invention more particularly relates to an improved floor grinding machine for grinding terrazzo floors.

Terrazzo floors are initially formed from poured concrete containing small marble chips. After the pouring and setting the floor surface must first be rough ground and then polished in order to render the same flat and smooth and to give the characteristic terrazzo appearance.

The rough grinding is generally a tedious time consuming and thus costly operation which involves the wheeling of a grinding machine back and forth along the floor. The most common prior art grinding machines utilize rotating grinding disks having abrasive blocks of aluminum oxide or similar abrasives which are moved in grinding contact with the floor. The grinding operation is generally effected as a wet grinding and water was fed between the blocks and the floor during the operation. Only a relatively small amount of material could be removed by the grinding at each pass and the abrasive blocks would wear quickly requiring frequent changes.

Terrazzo floor grinding machines utilizing diamond containing abrasive blocks have also been proposed. These machines grind at a faster rate and the abrasive blocks are much longer wearing. Due to the higher cutting rate however the maintaining of a uniform grinding pressure is more critical to successful operation and it is highly desirable that the operator be able to initially adjust the grinding pressure depending on the floor condition and to be able quickly to remove the blocks from grinding engagement and return the same with the same grinding pressure.

One object of this invention is a floor grinding machine for terrazzo floors capable of being operated in the above described manner.

A further object of this invention is a high speed terrazzo floor grinding machine in which the abrasive blocks may be maintained in very accurate grinding position at a preadjusted pressure and in connection with which the same may be quickly lifted out of grinding engagement and quickly returned at the preadjusted pressure.

A further object of this invention is a terrazzo floor grinding machine which utilizes diamond containing grinding abrasive and which may be operated more accurately and at a higher grinding rate than the prior art machines.

These still further objects will become apparent from the following description read in conjunction with the drawings in which:

FIG. 1 is a perspective view of an embodiment of a machine in accordance with the invention.

FIG. 2 is a further perspective view of the machine shown in FIG. 1.

FIG. 3 is diagrammatic side elevation showing the adjustment controls of the machine in FIG. 1.

FIG. 4 is a vertical cross section of the grinding head and shaft of the embodiment of FIG. 1.

FIG. 5 is a bottom plan view of the machine of FIG. 1, and

FIG. 6 is a top plan view of the machine of FIG. 1.

The floor grinding machine in accordance with the invention has a wheeled carriage adapted to be rolled across a floor to be ground. Preferably this carriage has front and rear wheels and most preferaby a pair of fixed front wheels and one or more pivotable tail wheels. A vertical rotary drive shaft is mounted on the carriage for limited axial movement and is adjustably urged downwardly with a resilient force. Grinding means such as a grinding disk with diamond containing abrasive blocks are mounted at the end of the shaft for grinding engagement with the floor as the carriage is wheeled along. Drive means are provided for rotating the shaft and means are provided for raising the grinding means out of grinding engagement. Preferably the grinding means are moved out of grinding engagement by providing means for raising and lowering the carriage with respect to its wheels between a lowered grinding position and a raised non-grinding position.

Referring to the embodiment shown in the drawing, **1** designates a carriage which is adapted to be rolled along a floor to be ground on the axially spaced apart front wheels **2** and the pivotable rear or tail wheel **3**. The carriage is provided with the handle arrangement **4** in order to allow the operator to push and manipulate the same. A hand lever **5** is pivotably connected to the carriage at **6** and a connecting rod **7** connects the lever **5** to a cross bar **8** which in turn is connected to a pair of spaced apart bell crank levers **9**. Each of the front wheels **2** is connected to the other end of an individual bell crank lever **9**, the center of the bell crank levers being pivotably connected to the carriage at **10**. When the lever **5** is released in the position shown in FIG. 3 the carriage **1** is lowered with respect to the front wheels **2** so that the machine will be in its grinding or operable position as hereinafter described. When the lever **5** is pulled backwardly as shown in FIG. 1 the bell crank lever **9** is rotated and the carriage **1** is thus raised with respect to the wheels **2** so that the machine will be raised to a non-grinding position as hereinafter described. The lever **5** may be retained in its rear position by means of the hook **11** and eye **12**, the hook **11** being attached to the handles **4** and the eye **12** to the lever **5**. Mounted on the carriage in front of the front wheels are a pair of vertical side by side tubular shaft casings **13**. Within each of the tubular shaft casings as may best be seen from FIG. 4 is the tubular bearing support sleeve **14** which carries the roller bearings **15** and **16**. The sleeve **14** is slidably mounted in the casing **13** having the slide ring **17** connected thereto which slides along the inner surface of the sleeve **13**. A similar slide ring **17A** aligns sleeve **14** axially inside sleeve **13** and the sleeve and casing **14** and **13** slide in contact therewith. Adjustment posts **18** connect the slide ring **17A** to the upper adjustment flange **19** and a coil spring **20** is compressed between the rings **17A** and **17**. Rotatably mounted in the bearings **15** and **16** is the drive shaft **21**. Connected to the lower end of the drive shaft **21** by a flexible connection in the form of the universal joint **22** is the grinding disk **23** having the diamond containing abrasive segments **24**, as may best be seen from FIG. 5

The universal joint designated at **22** is formed with the upper disk which is rigidly connected to the shaft **21** and two diametrically opposed pillar blocks **26** which are secured to this upper disk **25** by welding. A cross rod **27** pivots in these pillar blocks **26**. Further pillar blocks **28** are secured to the disk **23** by welding and the other arms of the cross bar **27** extend through these

pillar blocks **28** which allow pivoting of the disk **23** with respect thereto.

A pulley shaft **29** is rotatably mounted above the casing **13** in the bearings **30** and **31**. The pulley shaft **29** is connected for rotation with the drive shaft **21** by means of the sliding splined joint **32**. A drive pulley **33** is connected to the upper end of the pulley shaft **29**. Both the pulley shaft **29** and the drive shaft **21** are hollow and a water pipe **34** extends through the hollow interior thereof. This water pipe terminates at the lower with an outlet nozzle **35** which is directed through a hole **36** in the upper disk **25** and a hole **37** in the disk **23** so that water may be directed through the pipe **34** onto the floor for the grinding operation. The pipes **34** are cross connected by the cross pipe **38** which is fed through the T connection **39** by the flexible water hose **40** connected to a water supply. Pivotably mounted on the upper end of the upright support post **41** connected to the carriage is the cross bar **42**. Rigidly connected at each end of this cross bar **42** is a lever arm **43** with a wheel **44**. One of the wheels **44** rests in engagement with the flange plate **19** of one of the shaft casing units and the other wheel **44** is in contact with the flange **19** of the other shaft casing unit. Rigidly connected to the central portion of the cross bar **44** is the lever plate **45** provided with a central threaded opening through which the threaded end **46** of the crank column **47** extends. The opposite end of the column **47** is provided with the crank wheel and handle **48**. Column **47** extends through a bearing **49** connected to the handle **4** which allows rotation of the column **47** without axial movement. Thus by cranking the crank wheel **48** the plate **45** is screwed along threaded portion **46** pivoting the bar **42** and actuating the lever arms **43** and wheels **44** in the manner of a bell crank lever. Depending on the direction of rotation of the crank **48** the flanges **19** are moved up or down, thus decreasing or increasing the pressure of the springs **20** by action of the posts **18** on the rings **17A**. By cranking the handle **48** so that the plate **45** moves toward the screw end of the column **47** the spring pressure is increased and in the reverse direction the spring pressure is decreased. With an increase in the spring pressure, the tubular bearings sleeve **14** for bearings **15** and **16** and the drive shaft **21** is forced down with a greater pressure thus exerting a greater grinding pressure between diamond abrasive blocks **24** and the floor. Conversely by reducing spring pressure the grinding pressure is decreased.

Mounted on the carriage **1** between the front and rear wheels are a pair of electric motors **50** and **51** as for example 7½ H.P. motors. These motors are vertically mounted with the drive shafts extending upwardly. There attached to the upper end of each of these electric motors is a drive pulley **52** and **53** respectively. The drive pulley **52** is connected by means of the drive belt **52***a* to the pulley **33** of the shaft casing unit immediately in front of it and the pulley **53** is connected in the same manner by a belt **53***a* to the pulley **33** of the shaft casing unit immediately in front of it. The pulleys and belt arrangements may be provided with protective covers or casings as shown in FIG. 2. The motors **50** and **51** are connected by a conventional power cord to an electrical supply through the control boxes **54** and **55** respectively provided with the on and off switches. A box **56** with an ammeter for each motor may be provided for determining overload conditions.

In operation if the hand lever **5** is pulled rearwardly and secured in this position by means of the hooks **11** and the eye **12** the bell crank levers **9** are pivoted so that the wheels **2** are extended with respect to the carriage and the carriage is raised so that the diamond abrasive blocks **24** are clear of the floor and the device may be freely wheeled across the floor or transported in this manner without interference. For operation the motors are started driving the disks **23** in opposite directions at for example 2,000 r.p.m. and water from an ordinary garden hose type connection is passed through the pipe **40** passing through the pipes **34** and out through the the outlet nozzles **35** and the holes **36** and **37** wetting the floor in the area of the diamond abrasive blocks **24**. By releasing the hook **11** and slowly allowing the lever **5** to move forward the carriage **1** is lowered due to the retraction of the front wheels **2** with respect thereto so that the abrasive blocks **24** come into grinding engagement with the floor. The grinding pressure may be very accurately adjusted by means of the crank handle **48**. The carriage is wheeled back and forth across the floor for the grinding operation and may be very readily maneuvered due to the pivotable tail wheel **3**. As the carriage is stabilized between the front and rear wheels pressure pulling or pushing the handle **4** does not vary the grinding pressure which is simply controlled by adjustment of the crank wheel **48**. The combination of the axially movable spring loaded drive shaft **21** and the flexible connection of the disk **23** to the shaft provides the uniform floating grinding action which may be very accurately controlled. The abrasive blocks **24** may be quickly and easily raised out of grinding engagement with the floor by the operator simply pulling back on the lever **5** and may be returned to grinding engagement by allowing the lever **5** to go forward again, in each case being returned to the exact preset grinding pressure as determined by the adjustment of the crank wheel **48**. Though this pressure adjustment simultaneously effects both grinding shafts, each shaft can independently compensate for unevenness in the floor due to its individual spring loading.

While the invention has been described in detail with reference to the specific embodiments shown, various changes and modifications which fall within the spirit of the invention and scope of the appended claims will become apparent to the skilled artisan. The invention is, therefore, only intended to be limited by the appended claims or their equivalents wherein I have endeavored to claim all inherent novelty.

I claim:

1. Floor grinding means comprising a wheeled carriage adapted to be rolled along a floor to be ground, a vertical rotatable drive shaft mounted on said carriage for limited axial movement, means axially urging said shaft downwardly with a resilient force, said means for axially urging said shaft downwardly comprising an axially slidable bearing sleeve having bearings secured thereto in which said drive shaft is rotatably mounted, a resilient mechanism urging said sleeve downwardly, means for etxernally adjusting said resilient mechanism, a universal joint, grinding means mounted by said universal joint at the end of said shaft for grinding engagement with a floor, means for rotating said shaft and means for raising said grinding means to a position out of said grinding engagement.

2. Floor grinding machine comprising a wheel carriage adapted to be rolled along a floor to be ground, a vertical rotary drive shaft mounted on said carriage for limited axial movement, means axially urging said shaft downwardly with a resilient force, means for externally adjusting said resilient force, grinding means mounted at the end of said shaft for grinding engagement with a floor, means for rotating said shaft, means for raising said grinding means to a position out of said grinding engagement, front and rear wheels rotatably mounted on said carriage for movement of said carriage along a floor to be ground, a lever arrangement for raising and lowering said carriage with respect to said front wheels between a lower grinding position and a raised nongrinding position, a pair of vertical shaft castings mounted side by side on said carriage forward of said front wheels, a shaft bearing arrangement axially slidably positioned in each said shaft casing, spring means biasing each said shaft bearing arrangement downwardly, external adjusting means mounted on said carriage for varying the spring force, a vertical rotary drive shaft rotatably mounted in each bearing arrangement, a grinding disk with diamond

abrasive flexibly mounted on the end of each shaft in grinding arrangement with a floor when said carriage is in its lowered position, a pair of drive motors mounted side by side on said carriage between the said front and rear wheels, transmission means including a belt drive connecting each motor to a separate drive shaft for rotating said drive shafts in opposite directions, and means for feeding water under said disks.

3. Floor grinding machine according to claim 2 including water conduits extending through said drive shafts for feeding water.

4. Floor grinding machine according to claim 2 in which said discs are mounted on the end of said shafts by universal joints.

5. Floor grinding machine according to claim 4 in which said shafts are rotatably mounted in tubular bearing sleeves slidably mounted in said shaft casings and including a coil spring positioned between each said shaft casing and said tubular bearing sleeve slidably urging said tubular bearing casings downwardlys, a flange positioned above each of said shaft casings and connected for pressure actuation on the upper end of the coil spring associated with that shaft casing, a bell crank lever arrangement for pressure actuation on each said flange and a

crank handle arrangement for actuation of said bell crank lever.

6. Floors grinding machine according to claim 2 in which said front wheels are pivotably mounted on a bell crank lever and in which said lever arrangement for raising and lowering said front wheels includes a hand lever pivotably mounted on said carriage and connected to said bell crank lever through a connecting rod.

7. Floor grinding machine according to claim 2 in which said rear wheel is a single pivotably mounted tail wheel.

References Cited

UNITED STATES PATENTS

1,663,759	3/1928	Ham.	
1,571,571	2/1926	Cavicchi	51—177
1,583,145	5/1926	Haynes	51—177
1,601,087	9/1926	Simpson	15—49
1,773,992	8/1930	Gillis	15—49
1,924,582	8/1933	Wineman	51—177

OTHELL M. SIMPSON, Primary Examiner

U.S. Cl. X.R.

15—49