Dec. 31, 1957 W. E. HOLT 2,817,977

DRIVE UNIT FOR FLOOR TREATING MACHINES

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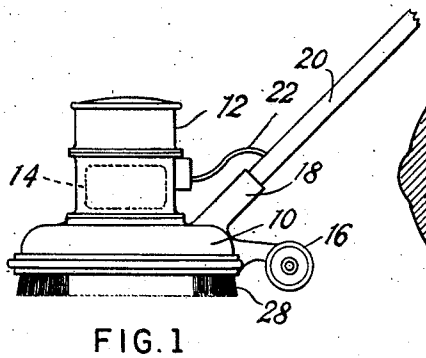


FIG. 1

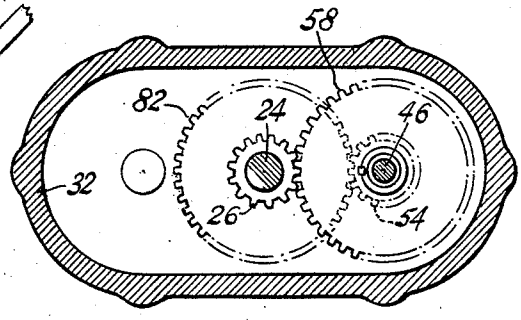


FIG. 2

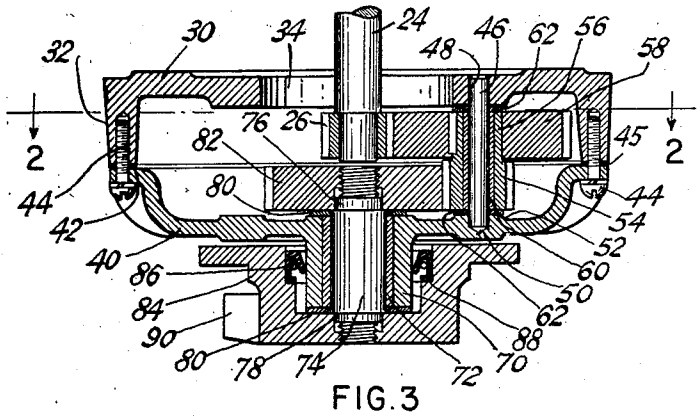


FIG. 3

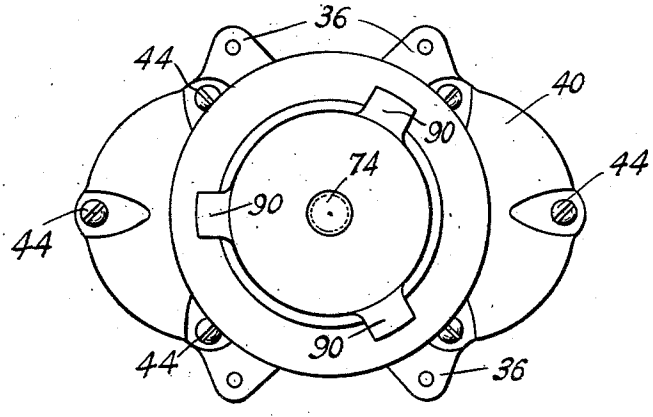


FIG. 4

INVENTOR
William E. Holt
BY
J. P. Moran
ATTORNEY

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DRIVE UNIT FOR FLOOR TREATING MACHINES

William E. Holt, Oakland, Calif.

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3 Claims. (Cl. 74—421)

This invention relates to the construction and operation of speed reduction drive units especially designed and adapted for use in portable floor treating machines.

Machines of this type, such as floor maintenance machines for brushing, polishing and the like, usually include a rotary surface treating element rotatable about a vertical axis and operatively connected to a manually controlled electric motor by a speed reduction drive unit. As disclosed in my joint U. S. Patent No. 2,468,929, the drive parts are usually enclosed in a one-piece rotatable housing constructed to contain a body of liquid lubricant in which the drive parts are immersed. The floor surface treating element is detachably connected to the rotatable housing and driven thereby.

The rotatable housing type drive unit disclosed in said prior Patent No. 2,468,929 is particularly designed for and especially useful in heavy duty floor machines. However its relatively numerous parts and dynamically balanced housing make it too heavy and expensive to manufacture for use in low cost light weight floor surfacing machines.

The object of the present invention is the provision of an improved construction of a speed reduction drive unit for floor treating machines of the character described which is characterized by its light weight, relatively few parts, low cost of manufacture, and ease of assembly and disassembly.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawing and descriptive matter in which I have illustrated and described a preferred embodiment of the invention.

Of the drawing:

Fig. 1 is a partly diagrammatic elevation of a portion of a portable floor maintenance machine adapted to be constructed in accordance with the invention;

Fig. 2 is a horizontal section through the drive unit taken on the line 2—2 of Fig. 3;

Fig. 3 is a vertical section through the drive unit; and

Fig. 4 is a bottom view of the drive unit.

In the floor maintenance machine illustrated in Fig. 1, an annular downwardly flared base plate **10** supports a substantially cylindrical housing **12** enclosing an electric drive motor **14**. A pair of supporting wheels **16** are tiltably mounted on the rear side of the base plate **10**. A socket **18** on the base plate receives a hollow handle **20** by which the machine is directed by the operator. The handle serves as a conduit for electrical connections **22** to the motor.

The drive motor **14** is arranged with its drive shaft **24** vertical and extending coaxially of the base plate **10**. A helical pinion gear **26** is keyed on the lower end of the drive shaft **24** and is operatively connected through a speed reducing drive unit enclosed by the casing **10** to a rotary floor treating element, shown for example, as a rotary brush **28**, as hereinafter described.

In accordance with the invention, the speed reducing drive unit comprises an elongated substantially elliptical housing top plate **30** having straight side edges and rounded ends and a peripheral depending flange **32** of corresponding shape, and extending downwardly to the level of the bottom of the drive shaft. The plate has a central opening **34** through which the drive shaft **24** projects. Projecting perforated tabs **36** symmetrically arranged on opposite sides of the periphery of the plate **30** permit the plate to be rigidly secured in position within the machine base plate **10**. The lower section of the drive unit housing is formed by a substantially elliptical dish-shaped bottom plate **40** arranged with its periphery **42** registering with the plate flange **32** and connected thereto at symmetrically spaced points by machine screws **44**. A flexible gasket **45** insures a fluid tight joint between the housing sections.

A short stationary vertical shaft **46** is positioned in an opening **48** in the top plate **30** and a recess **50** in a boss **52** in the bottom plate **40**, with a double idler gear unit rotatably mounted on the shaft **46**. The double idler gear unit consists of a lower helical gear **54** having an upper tubular extension **56** on which an oppositely pitched helical gear **58** of substantially larger diameter is keyed. A sleeve bearing **60** is press fitted into the gear **54** and extension **56** and rotatably contacts with the shaft **46**. Bronze washers **62** are arranged on the shaft **46** between the ends of the gear **54** and extension **56** and the boss **52** and top plate **30** respectively.

The housing bottom plate **40** has a central opening defined by a depending sleeve **70** positioned concentrically with the drive shaft **24**. A bronze sleeve bearing **72** is press fitted into the sleeve **70**. An auxiliary drive shaft **74** is rotatably mounted in the bearing **72** coaxially of the drive shaft **24** and has shouldered end portions **76** and **78** projecting respectively above and below bronze washers **80** positioned at opposite ends of the sleeve **70**. A helical gear **82** is detachably mounted on the threaded reduced upper end of the shaft **74** with its lower side engaging the shoulder **76**, and arranged to mesh with the gear **54**. The gear **82** is of a diameter approximating the minor axis dimension of the elliptical housing, so that this space is advantageously substantially fully occupied.

With the described gear and shaft arrangement and the housing containing a body of lubricant, such as grease or lubricating oil, the electric motor **14** is energized to drive the high speed shaft **24**, and, through the speed reducing gears **26, 58, 54** and **82**, the low speed auxiliary drive shaft **74**. The auxiliary drive shaft **74** carries a rotatable cup-shaped brush support bracket **84** which is threaded on the reduced lower end of the shaft **74** with its inner bottom surface in contact with the shaft shoulder **78** and washer **80**. The bracket **84** extends upwardly around the sleeve **70** in spaced relation therewith and with its upper end subjacent the underside of the housing bottom plate **40**. The space between the bracket and sleeve is rendered leakproof by an annular inverted U-shaped flexible gasket **86** seated on an annular shoulder **88** on the bracket and contacting with the sleeve **70**. Angularly spaced external lugs **90** are symmetrically arranged on the lower portion of the bracket **84** and adapted to detachably support the rotary brush **28** by bayonet type joints in a well known manner.

The described speed reducing drive parts may be easily and quickly assembled in the drive housing and the housing filled with lubricant to the desired level. The drive unit is then connected through the tabs **36** to the base plate **10** with the pinion gear **26** meshing with the idler gear **58**. The rotary surface treating element **28** is then mounted on the bracket **84** and the machine is ready for use.

The described drive unit is light in weight and of low cost, and yet highly effective as a speed reducing drive unit for machines of the character described. The leak-proof

construction prevents the leakage of lubricant onto the surface being treated, as well as the entrance of foreign material into the drive unit.

While in accordance with the provisions of the statutes I have illustrated and described herein the best form of the invention now known to me, those skilled in the art will understand that changes may be made in the form of apparatus disclosed without departing from the spirit of the invention covered by the claims, and that certain features of the invention may sometimes be used to advantage without a corresponding use of other features.

What is claimed is:

1. In a surface treating machine having a motor driven vertical main drive shaft, a speed reducing drive unit comprising a stationary drive unit housing of substantially elliptical horizontal cross-section adapted to contain a body of lubricant and into which said drive shaft projects, a vertically extending sleeve depending from the otherwise imperforate bottom of said stationary housing coaxially of said main drive shaft, a sleeve bearing fixed in said sleeve, an auxiliary drive shaft rotatably mounted in said sleeve bearing, a gear on the upper end of said auxiliary drive shaft having a diameter approximating the minor axis dimension of said elliptical housing and operatively connected to said main drive shaft, a cup-shaped bracket carried by said auxiliary drive shaft and surrounding said sleeve over a major portion of its length in spaced relation therewith, and sealing means seated in the sleeve-surrounding portion of said bracket and in contact with the outer surface of said sleeve for preventing the upward passage of lubricant through the annular space between said bracket and sleeve.

2. In a surface treating machine having a motor driven vertical main drive shaft, a speed reducing drive unit comprising a stationary sectional drive unit housing of substantially elliptical horizontal cross-section adapted to contain a body of lubricant and into which said drive shaft projects, a pinion gear on said shaft, a vertical stationary shaft mounted in said housing, a sleeve bearing surrounding said stationary shaft, a double idler gear mounted on said sleeve bearing and engaging said pinion gear, a vertically extending sleeve depending from the otherwise imperforate bottom of said stationary housing coaxially of said main drive shaft, a sleeve bearing fixed in said sleeve, an auxiliary drive shaft rotatably mounted in said sleeve bearing, a gear on the upper end of said auxiliary drive shaft having a diameter approximating the minor axis dimension of said elliptical housing and operatively connected to said double idler gear, and a cup-shaped bracket of circular horizontal cross-section carried by said auxiliary drive shaft and surrounding said sleeve in spaced relation therewith.

3. In a surface treating machine having a motor driven vertical main drive shaft, a speed reducing drive unit comprising a stationary sectional drive unit housing of substantially elliptical horizontal cross-section adapted to contain a body of lubricant and into which said drive shaft projects, a pinion gear on said shaft, a vertical stationary shaft mounted in said housing, a sleeve bearing surrounding said stationary shaft, a double idler gear mounted on said sleeve bearing and engaging said pinion gear, a vertically extending sleeve depending from the bottom of said stationary housing coaxially of said main drive shaft, a sleeve bearing fixed in said sleeve, an auxiliary drive shaft rotatably mounted in said sleeve bearing, a gear on the upper end of said auxiliary drive shaft having a diameter approximating the minor axis dimension of said elliptical housing and operatively connected to said double idler gear, a cup-shaped bracket carried by said auxiliary drive shaft and surrounding said sleeve over a major portion of its length in spaced relation therewith, and sealing means seated in the sleeve-surrounding portion of said bracket and in contact with the outer surface of said sleeve for preventing the upward passage of lubricant through the annular space between said bracket and sleeve.

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