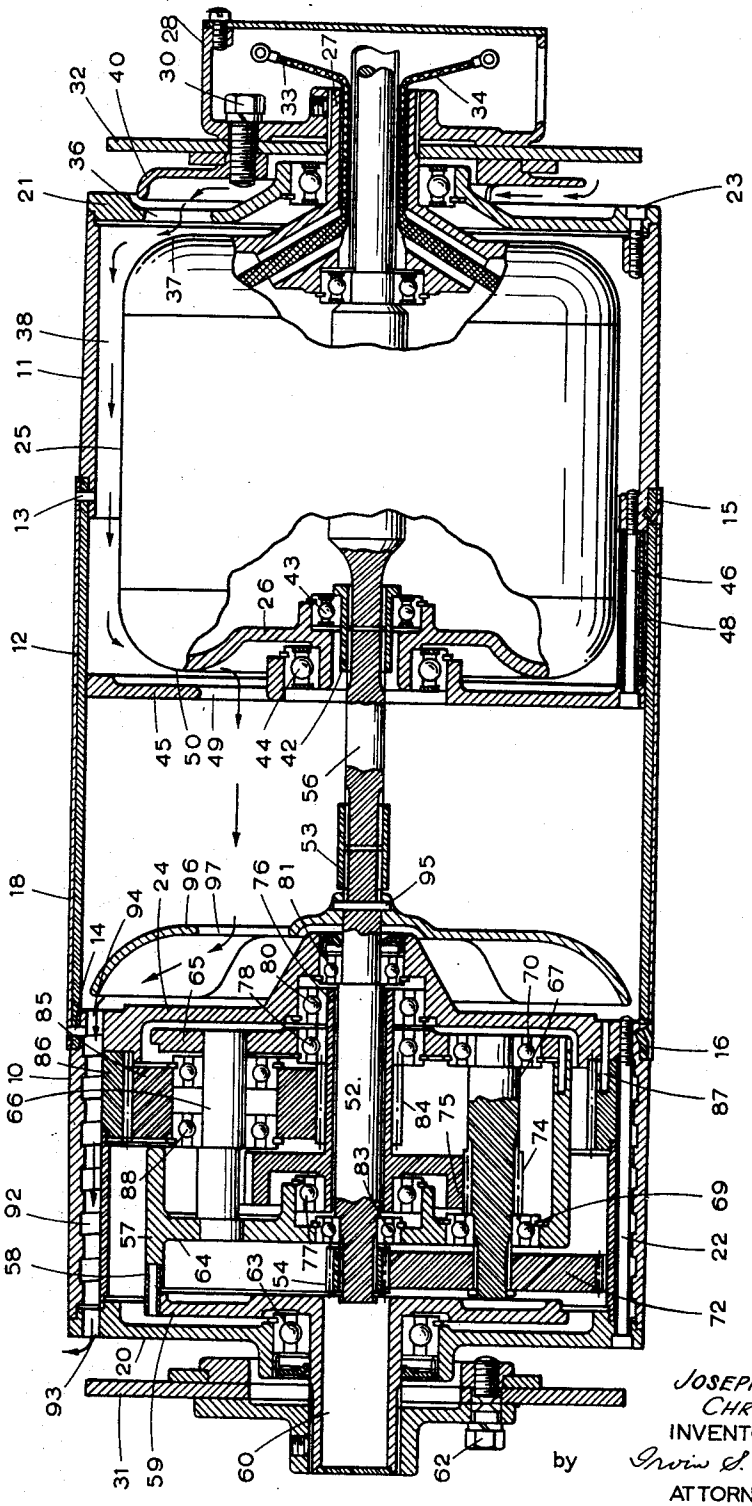
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MOTORIZED PULLEYS

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MOTORIZED PULLEYS

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This invention relates to pulleys of the kind comprising a pulley drum that contains an electric motor and a speed reducing gear that drivably connects the motor to the pulley drum.

The main object of the present invention is to provide an improved construction in the speed reducing gear whereby greater accessibility is provided for changing the ratio. Further objects are to provide improved bearing disposition, simplification of parts, accessibility of all parts for repair, quiet running and durability.

The invention will now be more fully described by way of example with reference to the accompanying diagrammatic drawing which is a sectional view of a pulley made in accordance with the invention.

The pulley comprises a pulley drum made in three parts viz. end parts **10**, **11** connected together to form a continuous pulley drum by an intermediate part **12** located between the parts **10**, **11** and fixed thereto by pins **13** and by sprags **15**, **16** bent inwardly out of the part **12** and engaging in notches in the parts **10**, **11**. The part **12** has a rubber or other coating **18**. The parts **10**, **11** are of approximately equal length and have end walls **20**, **21** fixed thereto by screws **22**, **23**.

An electric motor indicated generally by the arrow **25** has a totally enclosed housing **26** which is very desirable in wet or dusty working conditions. The housing **26** has a tubular spigot **27** that passes out of the drum through the wall **21** and carries a terminal box **28** that is fixed by bolts **30** to one of a pair of spaced apart side plates **31**, **32** normally provided in belt conveyor systems. The box **28** receives the ends of the motor conductors **33**, **34** and provides connection to a source of power.

The end wall **21** is mounted on a bearing **35** carried by the spigot **27** and has air flow openings such as **36** spaced from the periphery of the wall **21** so that air entering the drum through said openings contacts the end wall of the motor housing **26** at **37** is deflected thereby outwardly into an air flow passage **38** provided between the housing and the drum over the whole length of the housing. An air deflector plate **40** carried on the bolts **30** serves to guide air into the openings **36** and prevents entry into the drum of material dropping off the conveyor belt.

The motor spindle carries a splined sleeve **42** which is supported by a bearing **43** in the housing **26**. The housing **26** carries a bearing **44** on which is mounted an inner wall **45** which supports the drum part **12** and is bolted by bolts **46** to the motor-containing drum part **11** with the interposition of spacer means **48** so that by changing the spacer means the wall **45** can be adjusted axially along the drum part **12** whereby any length of motor can be accommodated.

The wall **45** has air flow openings **49** therein spaced from the periphery of the wall so that the air after traversing the whole length of the housing **26** is caused to flow over the outer end surface **50** of the motor housing for efficient cooling.

Within the drum part **10** is the speed reducing gearing which has a central shaft **52** coaxial with the drum and with the motor shaft and extending completely through the gearing from the motor side of the wall **24** where it carries a splined sleeve **53** to a position adjacent the outer end of the drum part **10** where it carries a high speed pinion **54**. The sleeve **53** is connected to the motor sleeve **42** by a short splined connecting shaft **56**. The gearing

includes a fixed gear housing **57** that is detachably fixed by dowel pins **58** to a plate **59** on a hollow spigot **60** that extends through the wall **20** and carries a fixing disc **61** that is attached by screws **62** to the side plate **31**. The wall **20** is mounted on a bearing **63** carried by the spigot **60**.

The gear housing has spaced walls **64**, **65** which carry a fixed countershaft **66** and a rotary countershaft **67**, the latter being mounted in bearings **69**, **70**.

The pinion **54** meshes with a gearwheel **72** on the rotary countershaft **67**. The pinion **54** and gearwheel **72** are located between the walls **59**, **64** so that if the spigot **60** and wall **59** are removed the pinion and gearwheel are at once accessible and can be changed to provide a different ratio without disturbing any parts inside the gear housing **57**.

The remaining gears are between the walls **64**, **65**.

The countershaft **67** carries an integral pinion **74** meshing with a gearwheel **75** that is carried on a sleeve **76**. This sleeve is mounted at opposite ends in bearings **77**, **78** carried respectively by the walls **64**, **65**.

The inner end of the sleeve carries a bearing **80** on which the drum wall **24** is mounted. The drum wall carries a bearing **81** in which one end of the shaft **52** is mounted, the other end of this shaft being mounted in a bearing **83** carried by the wall **64**.

The sleeve **76** carries an integral pinion **84** that meshes with an idler gearwheel **85** which, in turn meshes with internally toothed gear **86** fixed by dowel pins **87** to the drum wall **24**. The idler gearwheel is mounted by a bearing **88** on the fixed countershaft **66**. A spacer sleeve **90** is disposed between the drum wall **20** and the internal gear **86** and the parts **90**, **86** are spaced from the drum part **10** to define an air flow passage **92**. The walls **20**, **24** have air flow openings **93**, **94** therein adjacent the peripheries of these walls communicating with the passage **92**.

Mounted on the shaft **52** and fixed thereto by pin **95** is a fan **96** located on the motor side of the wall **24** close to said wall. The fan has air flow openings **97** therein spaced from its periphery and the fan is shaped to impel the air outwardly into the openings **94**. Thus, the fan draws air in through the openings **36**, over the end surface of the housing **26**, over the whole outer surface of the housing, over the outer end surface of the housing, through openings **49**, **97**, **94**, passage **92** to discharge at **93** whereby a continuous flow completely through the drum is achieved thereby providing highly effective cooling and enabling the motor to be used at high rating so that a smaller motor can be used for a given output.

In addition to the advantages above described:

The idler **85** on the fixed countershaft provides a simplication of parts.

The mounting of the fan on the gear shaft adjacent the gear enables the fan to remain in fixed position irrespective of length of the intermediate part **12** which can be varied according to the required belt width.

Attaching the spigot **27** to the plate **32** by the intermediary of the junction box provides a simplification and axial shortening of design.

The straight through gear shaft **52** facilitates mounting of bearings and backstop if required and overload release (e.g. by making **62** a shear pin) if required.

The gear housing **57** transmits the driving torque, provides an oil bath which can be adjusted as to angle about the gear axis. This housing can be connected to a shock absorber. The shaft **52** can be extended for connection to a further gear reduction device.

Accessibility is provided to all parts of the gearing and motor without moving the drum.

Since the length of part **10** is the same as that of part **11**, the middle of part **12** is always the middle of the

pulley face irrespective of the length of the motor or of part **12**.

If desired the inner surface of part **10** may be provided with a helical groove to eject any water or material that may enter at **93**.

The shaft **52** has widely spaced bearings and passes through sleeve **76** which is in effect a second rotary countershaft. The high speed pinion **54** and low speed pinion **84** are coaxial with each other. This arrangement facilitates smooth silent running.

I claim:

1. A pulley comprising drum, a first end wall detachably secured to one end of the drum, a second end wall detachably secured to the other end of the drum, an electric motor housed within one end of the drum, a first spigot, said motor having a housing carried at its outer end by said first spigot, said first spigot extending through the first end wall, said motor including a driven spindle coaxial with the drum, a speed reducing gearing housed within the other end of the drum and including a fixed housing, a second spigot extending through the second end wall and detachably connected to the outer end of said fixed housing, said gearing including a shaft coaxial with the motor spindle and connected thereto at its inner end and extending through said fixed housing to a position where its outer end is adjacent the second tubular spigot; a pinion on the outer end of said shaft, a countershaft mounted in the fixed gearing housing, a gearwheel on the countershaft meshing with said pinion, and gear means located between said pinion and the inner end of the shaft and connecting the countershaft drivably with the drum, whereby upon removal of the end wall and spigot the pinion and gearwheel become accessible and can be changed to obtain a different required driving ratio.

2. A pulley as claimed in claim 1 wherein said gear means includes a first toothed element on the countershaft, a sleeve on the coaxial gearing shaft, a second toothed element on said sleeve meshing with said first toothed element, a third toothed element on the sleeve, a toothed idler wheel which meshes with said third toothed element and internal teeth on the drum meshing with said idler.

3. A pulley as claimed in claim 2 wherein the idler wheel is rotatably carried on a fixed countershaft carried by the gearing housing.

4. A pulley as claimed in claim 2 wherein the sleeve is carried in bearings in two spaced walls of the gearing housing and the drum has an inner wall carried by a bearing on said sleeve.

5. A pulley as claimed in claim 1 wherein the drum is made in three parts, viz. two end parts housing the gearing and motor respectively and an intermediate part connected between the end parts, and the intermediate part contains an inner wall fixed to the adjacent end part with spacer means between said inner wall and end part, said inner wall being mounted on a bearing carried by the motor housing; whereby the spacer means can be changed to adjust the inner wall according to the length of the motor.

6. A pulley as claimed in claim 1 wherein said shaft is carried by a first bearing carried by the fixed housing between said pinion and said gear means, and a second bearing carried by an inner wall fixed to the drum.

7. A pulley comprising a drum, a first end wall detachably fixed to one end of the drum, a second end wall detachably fixed to the other end of the drum, a first inner wall mounted across the drum, a second inner wall mounted across the drum, an electric motor housed within one end of the drum and having a motor housing, a first spigot carrying one end of said motor housing and extending out of first end wall, a first bearing on the first spigot and carrying said first end wall, said motor including a driven spindle coaxial with the drum, a speed reducing gearing housed within the other end of the drum and including a fixed gear housing, a second spigot connected to said housing, said second spigot which extends through the second end wall of the drum said gearing including a shaft coaxial with the motor spindle and connected thereto at its inner end, a second bearing on the inner end of the motor housing, said second bearing carrying said first inner wall; a third bearing on said shaft carrying said second inner wall, third and fourth bearings spaced apart from each other along the shaft and supporting said shaft in said gear housing, said gearing including means drivably connecting said shaft with said drum.

8. A pulley as claimed in claim 7 wherein the drum is made in three parts, viz. two end parts housing the gearing and motor respectively and an intermediate part connected between the end parts, and the intermediate part contains said first inner wall bolted to the motor-containing end part with spacer means between said first inner wall and motor-containing end part, whereby the spacer means can be changed to adjust the inner wall according to the length of the motor.

9. A pulley as claimed in claim 1 having means for attaching the spigot respectively to the side plates of a conveyor apparatus.

10. A pulley as claimed in claim 8 wherein said means at the motor end includes an electric terminal junction box fixed on the first spigot and provided with bolt holes for fixing to the adjacent side plate of the conveyor apparatus.

11. A pulley comprising a drum, an electric motor mounted in one end of the drum, a reduction gearing mounted in the other end of the drum and drivably connected between the motor and the drum, an inner wall located between the motor and the gearing, means including bolts and spacer means for fixing the inner wall in any selected position axially of the drum to accommodate a selected length of motor, a bearing carried by the motor and mounted in said inner wall, said inner wall engaging the inner peripheral surface of the drum.

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