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PRESSURE MECHANISM FOR WOOD GRINDERS AND THE LIKE

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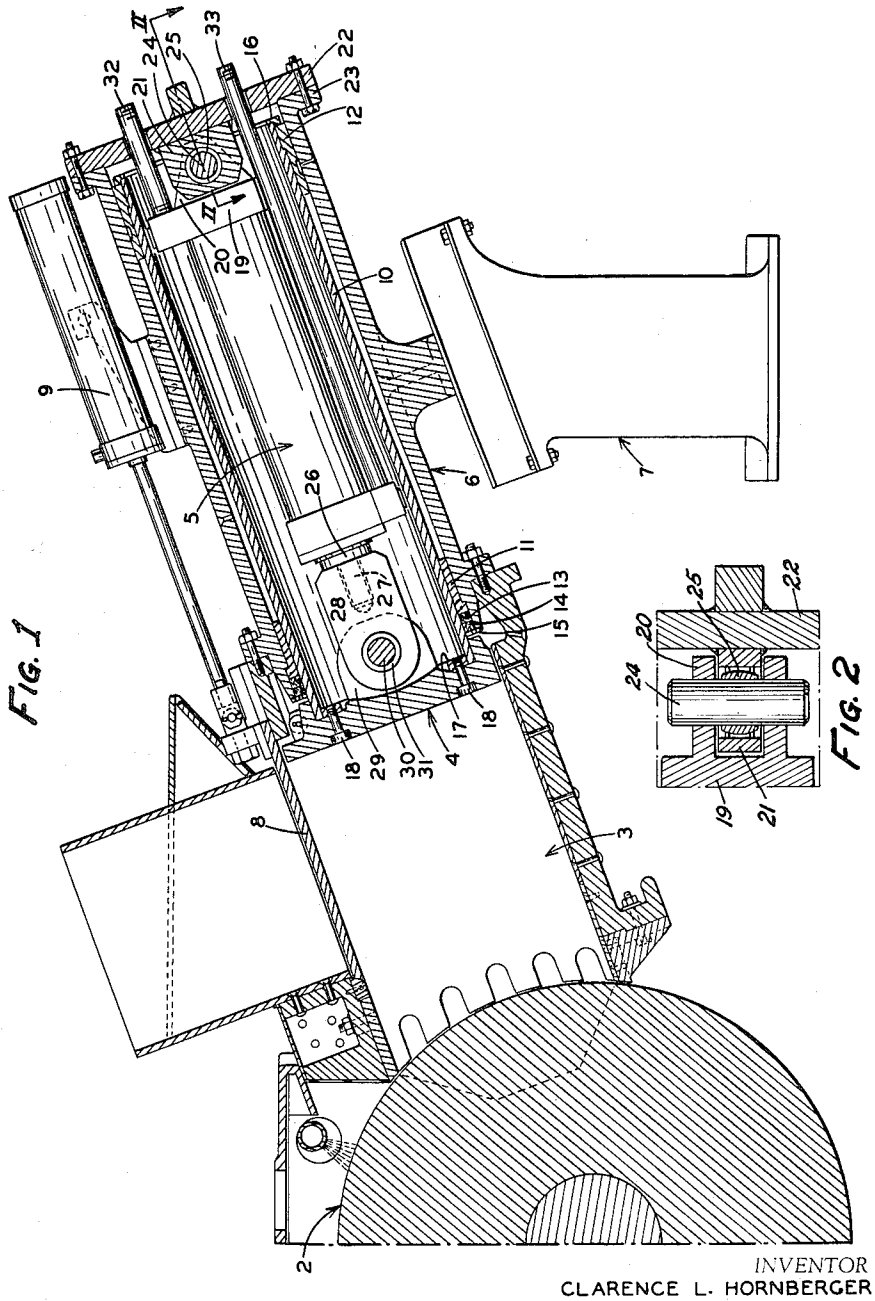


FIG. 1

FIG. 2

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PRESSURE MECHANISM FOR WOOD GRINDERS AND THE LIKE

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This invention relates to a fluid pressure actuated power unit and is concerned more particularly with a power unit for actuation of the pressure foot of a wood pulp grinder.

In grinding wood for use in the preparation of fibers for fiberboard manufacture, for paper pulp preparation, and the like, it is customary with the so-called Great Northern grinders to provide two or more wood-receiving pockets spaced circumferentially about the grinding stone. A pressure foot is provided in each of these pockets to press bolts of wood which are charged into the pocket into engagement with the grinding stone. Upon completion of each grinding cycle, the pressure foot is retracted, and a new charge of wood is deposited into the pocket for grinding.

Conventional practice has been to use water as the fluid under pressure for actuation of the power unit for the pressure foot. Any leakage of water from the hydraulic system which might pass into the pocket or into the grinder pit in these hydraulic actuated units did not contaminate the ground wood stock. Oil has not been used extensively as the actuating fluid because of possible stock contamination. Leakage most frequently occurs through packing failure at the piston rod as a result of damage to the piston rod or as a result of excessive wearing of it. This problem of minimizing sealing failure is aggravated where the pressure foot is of great weight and is massive and is supported on the outboard end of the piston rod, without adequate guiding of the pressure foot to minimize wear on the piston rod and to reduce the likelihood of bending or other permanent damage to the rod.

An object of the invention is to provide a fluid under pressure operated cylinder and piston power unit in which guiding of the member actuated by the power unit is separated from the thrust element of the power unit.

Another object of the invention is to provide a power actuating unit for the foot of a wood grinder or the like in which the pressure foot is guided independently of the actuating unit.

In wood grinding, there is a real production advantage to be gained if the pressure foot can be retracted quickly for charging of the wood into the pocket and can be moved quickly in a reverse direction after charging has been completed to bring the wood into engagement with the grinding stone. This rapid retraction and rapid "gripping" of the wood cannot be accomplished with the conventionally used large diameter hydraulic power units unless extremely large valves, pipes, and ports are provided in the system, for large volumes of fluid must be inletted into and discharged from the power unit in a short time interval to effect such rapid movement of the piston in the unit. Large diameter hydraulic power units have been required in the past to provide an adequately strong piston rod and piston to support the weight of the massive pressure foot and to provide an extensive sealing surface at the piston rod in an effort to reduce leaks in the system.

Another object of the invention is to provide a small diameter fluid pressure power unit in a system including a heavy, massive pressure member which, because of the small size of the power unit, may be operated at high speed without large valves, pipes, ports, and the like.

Other objects of the invention will be clear from consideration of the following description of an embodiment of the invention which will be described in conjunction with the attached drawing, in which:

Figure 1 is a diagrammatic sectional view of a wood grinder embodying the hydraulic power unit of the present invention;

Figure 2 is a sectional view taken on the line II—II of Figure 1.

The unit shown in the drawing comprises a grinding stone **2**, a wood pocket **3**, and a pressure foot **4** arranged to press bolts of wood received in the pocket **3** into engagement with the rotating grinding stone **2** to reduce the wood to fibrous form for use in the manufacture of fiberboard, for instance. Movement of the pressure foot **4** in the application of pressure thereto to effect grinding is provided by a fluid pressure cylinder and piston power unit or fluid power motor **5** which is received within a housing **6** mounted upon a stand **7**. A gate **8** closes the top of the wood pocket **3** and is actuated by a power cylinder and piston unit **9**.

The pressure foot may be of large size and great weight where the grinding unit includes a 54" diameter stone, for example, having a 34" wide working face, used for grinding wood for fiberboard manufacture. As mentioned previously, one of the problems involved with a pressure foot of this size and weight is to guide the same properly for rapid actuation and for operation at relatively high pressure during the grinding cycle. It is not feasible to mount the unit in such fashion that it is supported by the piston rod of the hydraulic cylinder power unit. In the embodiment shown in the drawing, the pressure foot **4** is supported independently of the power unit **5**. This is effected by use of a sleeve **10** which is guided in bearings **11** and **12**.

Bearing **11** is received within the forward end of housing **6** in fixed position therein. A pair of sealing rings **13** and **14** are provided forward of the bearing **11** and engage the outer cylindrical surface of sleeve **10**. A retaining ring **15** is fixed to the housing **6** and holds the seals in position within the housing.

Bearing **12** is mounted on the sleeve **10**, and the bearing **12** slides within the machined inner cylindrical surface of the housing **6**. A flanged retaining ring **16** is secured to sleeve **10** and holds bearing **12** in fixed position on the sleeve **10** for its sliding movement within housing **6**.

The forward end of sleeve **10** is provided with a flange **17** which may be of annular configuration and may be welded to sleeve **10**. The pressure foot **4** preferably is bored to receive the flanged end of the sleeve **10** and is bolted thereto by bolts **18**.

From the foregoing, it will be clear that the pressure foot **4** is fully supported by the sleeve **10** which is mounted for axial movement in housing **6** to bring the pressure foot **4** into engagement with bolts of wood received in the pocket **3** and to press the bolts of wood into engagement with the grinding wheel **2** for grinding upon application of force to the pressure foot.

This axial movement of the sleeve and the pressure foot attached to it and the application of pressure to the pressure foot for grinding is imparted by the fluid pressure actuated power unit **5** which is preferably a double acting piston and cylinder power unit deriving its power from oil, water, or other fluid under pressure applied to the piston and the cylinder. The unit **5** is

mounted within the sleeve **10**. The rear end bell **19** of the unit is provided with a clevis connection **20** which cooperates with a tongue **21** welded to a reinforced end cap **22** which is bolted or otherwise secured to a flange **23** on housing **6**. A clevis pin **24** connects the members **20** and **21** of the clevis connection, the pin **24** being received within a self-aligning bearing member **25** to provide for limited self-adjusting movement of the power unit **5** during movement of the sleeve **10**.

The piston rod **26** of the power unit **5** is provided with a connection for effecting sliding movement of the sleeve **10**. In the embodiment shown, there is provided a threaded outboard end **27** which receives a threaded tongue connection **28**. The connection **28** is associated with the bifurcated prongs of a clevis connection **29** provided on pressure foot **4**. A clevis pin **30** and a self-aligning bearing **31** similar to the connection on the end bell **19** are provided to permit the necessary minor self-adjusting movements of the power unit **5** during operation to accommodate radial irregularities in the axial movement of the sleeve.

The usual pipe connections **32** and **33** to the upper and lower end bells of the double acting power unit **5** are provided for admission and exhaust of actuating fluid for the unit.

In operation of the device, fluid under pressure may be applied through pipe **32** to the piston of double acting fluid power motor **5**. This will serve to move piston rod **26** to which pressure foot **4** and guiding sleeve **10** are attached in a direction toward the grinding wheel **2**. The cylinder of fluid power motor **5** which is attached to end cap **22** on the housing **6** remains stationary except for the limited adjusting movement provided by the clevis and self-aligning bearing connection **24—25** between the end bell **19** and the end cap **22** and the similar connection **30—31** between the piston **26** and the pressure foot **4**. Sleeve **10** will be guided in its movement by bearing **11** affixed to housing **6** and bearing **12** affixed to sleeve **10**. When it is desired to reverse the direction of movement of pressure foot **4**, fluid under pressure may be applied through pipe **33** to the opposite side of the piston of fluid power motor **5**.

With the unit shown in the drawing, a high pressure, small diameter, fluid actuated power unit is provided which may be arranged for rapid movement of the piston in the power unit without the requirement for extremely large valves, pipes, and ports, usually required where large diameter, hydraulic cylinder units are provided for actuating the pressure foot in pulpwood grinders. Also, the arrangement provides for guiding of the pressure foot during its travel by means wholly independent of the power unit, and thus the piston rod of the power unit does not support the weight of the pressure foot and the reactive thrust on the piston rod during the high pressure grinding cycle is essentially parallel to the axis of the rod, minimizing wear on the rod and permitting good sealing to be effected between the piston rod and the cylinder and reducing the possibility of fluid leakage from the power unit which might result in contamination of the wood pulp stock.

While the invention has been described in particular relationship to a pulpwood grinder, the arrangement will be useful in other applications. It will be particularly useful where the member actuated by the power unit, such as the pressure foot in the embodiment illustrated, is relatively heavy.

I claim:

1. A fluid pressure actuated power unit comprising a housing, a sleeve received within said housing, bearing means supporting said sleeve for sliding movement relative to said housing, a fluid pressure actuated power motor including a piston and cylinder, said power motor being disposed within said sleeve, and means operatively connecting said power motor to said housing outboard with respect to said sleeve and to said sleeve for imparting axial movement to said sleeve upon relative movement between said piston and cylinder upon application of fluid under pressure thereto.

2. In a wood grinder the combination of a housing, a sleeve received within said housing, bearing means supporting said sleeve for sliding movement relative to said housing, a pressure foot attached to and closing one end of said sleeve, a double acting fluid pressure actuated power motor including a piston and cylinder disposed within said sleeve, and means operatively connecting said power unit to said housing and to said sleeve for imparting axial movement to said sleeve upon relative movement between said piston and cylinder upon application of fluid under pressure thereto.

3. In a wood grinder including a wood pocket and a pressure foot movable in said pocket, the combination of a power unit for actuation of said pressure foot comprising a housing, a sleeve for carrying said pressure foot, said sleeve being received within said housing, bearing means supporting said sleeve for sliding movement relative to said housing, an end cap secured to the outboard end of said housing, a double acting fluid pressure actuated power motor disposed within said sleeve, and means connecting said power motor to said end cap and said sleeve for sliding said sleeve relative to said housing.

4. In a wood grinder including a wood pocket and a pressure foot movable in said pocket, the combination of a power unit for actuating said pressure foot comprising a housing; a sleeve for carrying said pressure foot, said sleeve being received within said housing; bearing means supporting said sleeve for sliding movement relative to said housing; a double acting fluid pressure actuated motor for powering the movement of said sleeve, said unit including a cylinder, a piston movable in said cylinder, and a piston rod connected to said piston; means connecting said cylinder to said housing for slight pivotal and rotary motion relative thereto; and means connecting said piston rod to said sleeve for similar movement to accommodate radial irregularities in the axial movement of said sleeve relative to said housing.

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