Aug. 13, 1929. F. E. STRATTON 1,724,050

SWING FRAME GRINDER

Original Filed Dec. 19, 1927

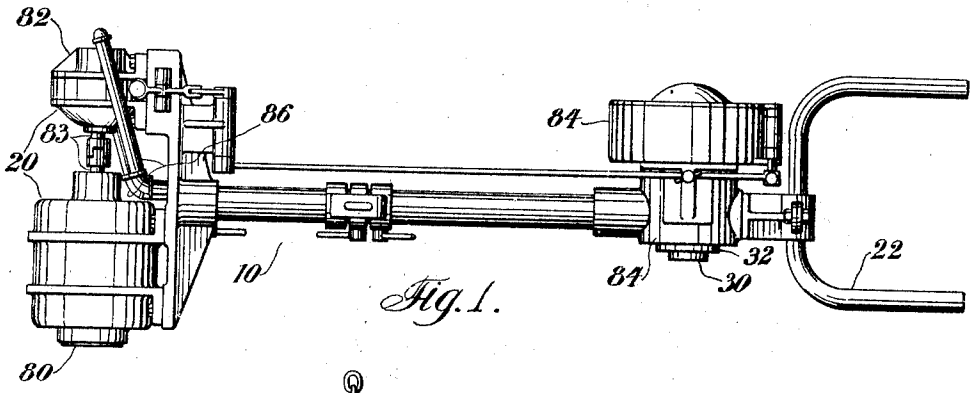


Fig. 1.

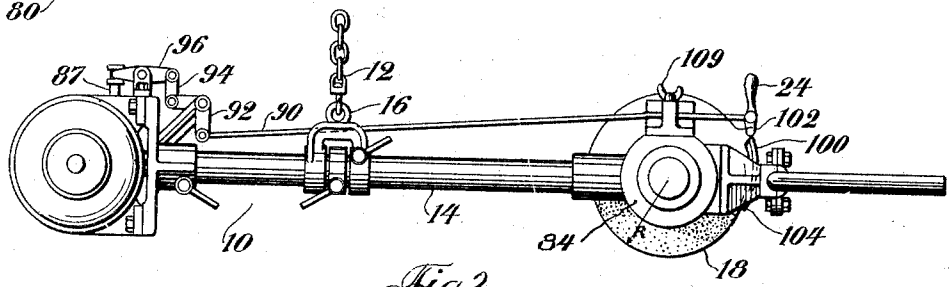


Fig. 2.

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UNITED STATES PATENT OFFICE.

FRANK E. STRATTON, OF CRANSTON, RHODE ISLAND, ASSIGNOR TO DIAMOND MACHINE CO., OF PROVIDENCE, RHODE ISLAND, A CORPORATION OF RHODE ISLAND.

SWING-FRAME GRINDER.

Original application filed December 19, 1927, Serial No. 241,152. Divided and this application filed November 15, 1928. Serial No. 319,660.

My invention relates to swing frame grinders.

In swing frame grinders it is well known that the speed at which the grinding wheel thereof may be driven must have an upper limit for if the wheel is driven beyond this limit the centrifugal force of the rotating wheel will be greater than the binding action of the adhesive employed to join the abrasive grains thereof together, thereby causing the wheel to explode and fall to pieces.

So far as I am aware however, no one has hitherto discovered that as the diameter of the wheel wears down in use its tendency to fall to pieces is substantially diminished in proportion and that as the wheel wears down in use the peripheral speed may be increased, thereby clearly increasing the efficiency of the grinding without any danger to the workmen. I believe therefore, that I am the first to provide a swing frame grinder in which the peripheral speed of the grinding wheel may be increased with safety as the grinding wheel wears down in use and my invention broadly consists in providing in a swing frame grinder, means to increase the peripheral speed of the grinding wheel as the grinding wheel wears down in use and broadly speaking it is immaterial whether this means is mechanical as shown in one type in the drawings of my copending application of which this is a division or hydraulic as shown in another type in the drawings of this application, or otherwise. Specifically applying my principle to a swing frame grinder I locate the wheel on one end of the fulcrum of the swing frame grinder and the driving means therefor on the opposite end thereof and the speed changing means in any desired location thereon, said speed changing means preferably being controlled by a manually operated movable member preferably located adjacent the usual operating handle of the swing frame grinder.

I also realize that even though the wheel does wear down in use there constantly remains an upper limit of peripheral speed at which the wheel must not be driven in order to operate with safety and I therefore provide in combination with the speed changing means hitherto referred to, means adapted to contact said wheel to prevent movement of said speed changing means to increase the driven peripheral speed of said wheel until the wheel has worn down preferably predetermined amounts in use. It is thus apparent that although any type of speed changing means may be employed, my preferred type of speed changing means consists of a mechanical change speed gear and I have especially designed a mechanical change speed gear which will operate in a straight line to render this type of mechanism practical on a swing frame grinder as shown in my copending application for Letters Patent, Serial #241,152, for swing frame grinders, filed December 19, 1927, of which this is a division specifically directed to the hydraulic type shown therein.

I show in the drawings a hydraulically controlled and operated swing frame grinder which for purposes of operation on a swing frame grinder is preferably constructed to operate in a straight line.

A further feature of my invention consists of means to lock the change speed mechanism thereof at any desired predetermined position, thereby preventing an unskilled operative from causing danger to himself and other workmen by tampering with my safety adjustment for the peripheral speed of the wheel.

Further objects of my invention relate to a design of swing frame grinders in which the aforementioned features may be incorporated so constructed as to add a relatively small amount of weight to the swing frame grinder, and a minimum number of parts with the added parts so distributed that they in no way affect the ready manipulation of the swing frame grinder.

These and such other objects of my invention as may hereinafter appear will be best understood from a description of the accompanying drawings which illustrate an embodiment thereof.

Fig. 1 is a plan view of a swing frame grinder employing a hydraulic drive into which the speed changing and safety features of my invention are incorporated.

Fig. 2 is a side elevation of the embodiment of my invention shown in Fig. 1.

In the drawings, wherein like characters of reference indicate like parts throughout,

10 generally indicates a swing frame grinder constructed in accordance with my invention, the swing frame grinder normally including the support 12 suitably mounted as usual above a frame 14, suitable means 16 to fulcrum said frame on said support, a grinding wheel 18 mounted on said frame 14 on one side of said fulcruming means 16, a motor 80 to drive said wheel mounted on said frame 14 on the opposite side of said fulcruming means 16, driving mechanism for said wheel 18 actuated by said motor and an operating handle 22 attached to said frame adjacent said wheel 18. I therefore incorporate into a standard type of swing frame grinder as just described, means to increase the driven speed of the wheel 18 as the wheel wears down in use which means preferably includes a manually operated movable member 24. The means to increase the driven speed of the wheel as the wheel wears down in use may consist of any suitable type of hydraulic means for this purpose.

As is customary in swing frame grinders, the grinding wheel 18 is suitably mounted on the cross shaft 30 in suitable bearings 32 on the end of the frame adjacent the operating handle 22. The grinding wheel cross shaft 30 is driven by the hydraulic motor 84 suitably mounted on the frame 14.

I provide a hydraulic system as the driving mechanism for said wheel specifically modified so as to include specific means to increase the driven speed of the wheel 18 as the wheel wears down in use. In this embodiment, the means to drive said wheel consists of the electric motor 80 and the hydraulic pump 82. The driving mechanism for said wheel includes the hydraulic motor 84 located near the operating handle end 22 of the swing frame grinder 10 on the opposite side of the fulcruming means 16 from the hydraulic pump 82 and the pipes 86 suitably connecting said hydraulic pump 82 with said hydraulic motor 84 which revolves the grinding wheel cross shaft 30. Thus in practice the electric motor 80 drives the wheel of the hydraulic pump 82 located on substantially the same main drive shaft 83 therewith and the liquid from the hydraulic pump 82 is circulated through the pipes 86 to revolve the hydraulic motor 84 which is mounted on the cross shaft 30 on which the grinding wheel 18 is mounted. In this embodiment the means to change the driven speed of the grinding wheel 18 consists of means to increase the stroke of the hydraulic pump 82 to increase the amount of fluid transmitted through the pipes 86 and forced against the blades of the hydraulic motor 84.

Any suitable type of hydraulic motor 84 may be employed and generally the hydraulic motor 84 is of the same type as the hydraulic pump 82. As it is necessary, however, to change the stroke of the hydraulic pump 82, this preferably consists of a pump in which the driving axis may be moved off center to vary the stroke thereof to vary the amount of fluid transmitted thereby. A suitable type of pump for this purpose is manufactured by the Oil Gear Company of Milwaukee, Wisconsin, and another suitable type of pump which may be employed is that described in Patents Nos. 1,152,729, 1,077,979, and 1,152,579 to Hele-Shaw in which the pump fulcrum is shifted by proper regulation of a pilot valve. The aforementioned patents are hereby referred to for further details of this pump. As shown in Figs. 1 and 2 the shaft 87 controls the pilot valve which changes the pump fulcrum to vary the stroke thereof to vary the amount of fluid transmitted through the connecting pipes 86 to vary the speed of the hydraulic motor 84 which as explained drives the grinding wheel 18. The means to change the speed changing means, which in this instance comprises the hydraulic pump 82 instead of the change speed gearing shown in the parent application includes a manually operated movable element 24 adjacent the operating handle 22 connected by means of the arm 90, bell crank lever 92 and link 94 and lever 96 respectively to the shaft 87, which increases the stroke of the pump in a manner as explained to increase the speed of the hydraulic motor and hence grinding wheel as the wheel wears down in use.

As stated hitherto, I preferably employ means adapted to contact said grinding wheel 18 and connected to said speed changing means, to prevent shifting of the said speed changing means to increase the driven speed of said wheel until said wheel is worn down predetermined amounts in use. Said means comprises a lever 100 suitably pivoted as at 102 having one arm 104 thereof adapted to continuously contact said rotating wheel 18 and having the other arm thereof forming the operating handle 24 so that the operating handle can not be moved to shift the speed changing means to increase the driven speed of the grinding wheel until the wheel 18 wears down in use a predetermined amount. From an inspection of drawings, it is thus obvious that the operating handle 24 can only be moved further inwards in so far as the end 104 of the lever 100 may be moved inwards against the decreasing perimeter of the grinding wheel, thereby providing the safety factor heretofore described. The means to lock the speed changing means in any desired predetermined position includes the threaded clamp 109 adapted to contact the arm 90 to clamp the arm 90 in any desired predetermined position.

It is thus apparent that I have provided a swing frame grinder designed specifically to take into consideration, the normal requisites of a swing frame grinder, namely those of equalizing the balance, keeping down the weight, etc., into which has been incorporated a means to increase the peripheral speed of the grinding wheel for greater efficiency as the grinding wheel wears down in use and also safety means to prevent said increase above a safety limit until the wheel is worn down in use a predetermined amount.

It is understood that my invention is not limited to the specific embodiment shown and that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What I claim is:

1. In a swing frame grinder, a grinding wheel, a hydraulic motor to drive said wheel, a hydraulic pump connected to said motor, means to drive said hydraulic pump, means to increase the stroke of said motor to increase the speed of the hydraulic pump and grinding wheel as the wheel wears down in use and means adapted to contact the grinding wheel and connected to said stroke changing means to prevent movement thereof to increase the driven speed of said wheel until the wheel has worn down in use.

2. In a swing frame grinder, a support, a frame, means to fulcrum said frame on said support, a grinding wheel mounted on said frame on one side of said fulcruming means, a hydraulic motor for driving said wheel mounted on said frame adjacent said grinding wheel, a hydraulic pump for driving said hydraulic motor connected to said hydraulic motor mounted on said frame on the opposite side of said fulcruming means, an operating handle attached to said frame adjacent said grinding wheel, means including a manually operative movable element adjacent the operating handle to increase the stroke of said pump to increase the speed of the hydraulic motor and hence grinding wheel as the wheel wears down in use and means adapted to contact the grinding wheel and connected to said stroke changing means to prevent movement thereof to increase the driven speed of said wheel until the wheel has worn down in use.

3. In a swing frame grinder, a support, a frame, means to fulcrum said frame on said support, a grinding wheel mounted on said frame on one side of said fulcruming means, a hydraulic motor for driving said wheel mounted on said frame adjacent said grinding wheel, a hydraulic pump for driving said hydraulic motor connected to said hydraulic motor and means to drive said hydraulic motor mounted on said frame on the opposite side of said fulcruming means, an operating handle attached to said frame adjacent said grinding wheel, and means including a manually operative movable element adjacent the operating handle to increase the stroke of said pump to increase the speed of the hydraulic motor and hence grinding wheel as the wheel wears down in use.

In testimony whereof I affix my signature.

FRANK E. STRATTON.