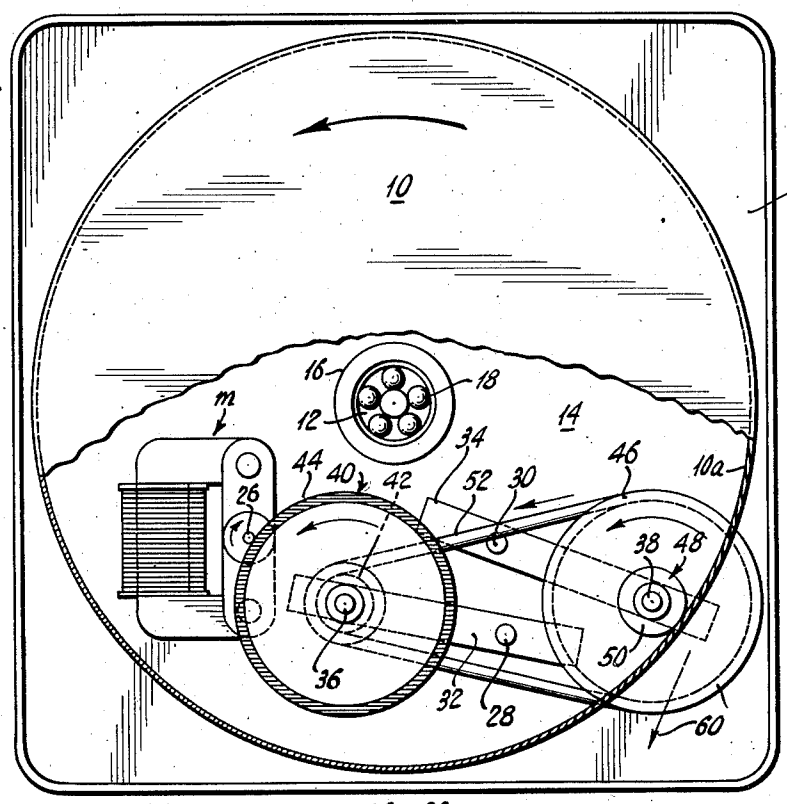
Jan. 4, 1949. T. VEITCH ET AL 2,458,036

POWER TRANSMISSION AND SPEED REDUCING APPARATUS

Filed Oct. 22, 1947

Fig. 1.



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Fig. 2.

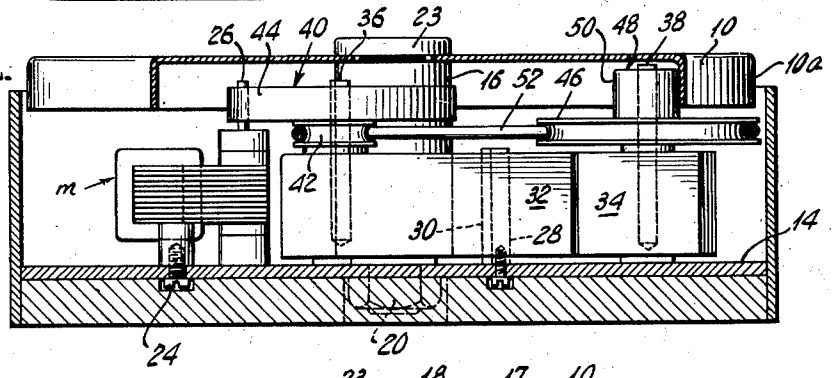
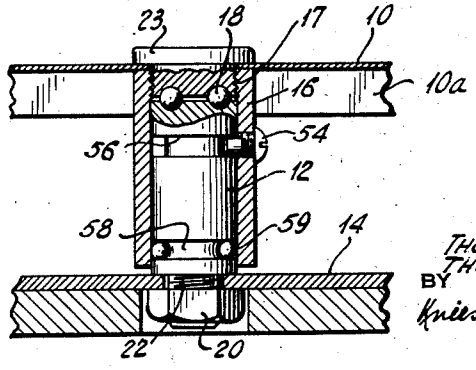


Fig. 3.



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POWER TRANSMISSION AND SPEED REDUCING APPARATUS

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11 Claims. (Cl. 74—208)

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This invention relates to power transmitting and speed reducing apparatus. It is particularly adapted for use where a very considerable reduction in speed is desired between the source of power and a driven member, such for example as a turntable employed to support and slowly rotate articles as in displaying them in store windows and elsewhere.

Heretofore it has been customary to use a train of gears for obtaining the desired speed reduction and this is undesirable because a number of gears are required which must be mounted to engage with precision.

Where the reduction is from on the order of 3300 R. P. M. to 2½ R. P. M. five or six gears are employed and the tolerances permitted are very low. A great deal of difficulty has been encountered with devices of this kind now in use because of the great frequency with which they break down and must be taken out of use for mechanical repair and for regular periodic lubrication.

An object of this invention is to provide a simple and practical device of the above mentioned kind.

Another object of the invention is to provide an improved turntable drive.

Another object of the invention is to provide a triple speed reduction from a high speed source of power to a member or work piece to be driven at slow speed.

Another object of the invention is to provide a drive of the above mentioned kind wherein the frictional engagement between the speed reducing means and the source of power on one hand, and the driven member on the other, increases in proportion to the load.

Another object of the invention is to provide power transmitting and speed reduction means adapted to lightly contact its driving means initially and to increase its frictional engagement with said driving means after starting, and as its frictional engagement with the member to be driven increases.

Other objects of the invention will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, arrangements of parts, and in the several steps and relation and order of each of said steps to one or more of the others thereof, all as will be pointed out in the following description, and the scope of the application of which will be indicated in the following claims.

The invention will best be understood if the

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following description is read in connection with the drawings, in which,

Figure 1 is a top plan view of apparatus embodying the invention applied to a turntable, with the turntable partly cut away;

Figure 2 is a side elevation partly in section; and

Figure 3 is a side vertical sectional view of the mounting means for the turntable.

In the embodiment of the invention shown herein the turntable **10**, which has the downwardly extending annular flange **10a** adjacent its periphery, is rotatably mounted on a bearing post **12** fastened to, and projecting upwardly from, the base **14**. The turntable **10** has a centrally disposed downwardly projecting sleeve **16** adapted to fit over and around the bearing post **12**, and the top of the bearing post and the opposed surface at the upper end of said sleeve may be grooved to receive between them ball bearings **18**. The bearing post **12** may be reduced in diameter at its lower end and be extended through an aperture provided therefor in the base plate **14** and may be secured to the base plate as by means of nut **20** engaging the threads **22** provided on the exterior of said bearing post at its lower end. The sleeve **16** may be secured to the turntable as by means of nut **23** engaging the threads **17** provided on the inner surface of the sleeve at its upper end. The bottom of nut **23**, which is the surface opposed to the top of the bearing post at the upper end of said sleeve, may be grooved to cooperate with the top of the bearing post in providing a race for the ball bearings **18**.

Also mounted on the base **14** as by screws **24** is an electric motor, which desirably may be a small motor *m* such as a shaded pole type, having the drive shaft **26** which as illustrated herein projects upwardly at right angles to the base **14**.

Also projecting upwardly from the base are the pivot pins **28** and **30** on which are pivotally mounted the pulley carrying members **32** and **34**. As shown herein these members are narrow and elongated and positioned adjacent one another, and with their pivots off center and dividing said members into arms of unequal length, the pivot for member **32** being nearer the end of member **32** which is remote from the motor, and the pivot for member **34** being nearer the end of member **34** which is adjacent said motor.

Projecting upwardly from adjacent the end of member **32** which is near said motor (the outer end of the long arm of member **32**) is a bearing pin **36**, and projecting upwardly from the end of member **34** which is remote from said motor (the

outer end of the long arm of member 34) is a bearing pin 38. The pivot pins 28 and 30 are disposed on opposite sides of a line joining said pulley bearing pins 36 and 38 when the latter are in operative position. On pin 36 a large pulley 40 and a small pulley 42 are mounted for rotation as a unit, and as shown herein said pulleys are formed integrally. Large pulley 40 has around its periphery a band of friction material 44 such as rubber or the like and is adapted to frictionally engage the motor shaft 26. The smaller pulley 42 is a grooved pulley adapted to receive a driving belt.

On shaft 38 a large pulley 46 and a small pulley 48 are mounted for rotation as a unit and as shown herein said pulleys are formed integrally. Large pulley 46 is grooved around its periphery to receive a driving belt. Small pulley 48 comprises around its periphery a band 50 of friction material such as rubber or the like and is adapted to contact the inner surface of the annular flange 10a depending from the turntable. All of said pulleys preferably have anti-friction bearings so that they rotate freely on said pins. The small pulley 42 on shaft 36 and the large pulley 46 on shaft 38 are interconnected for driving by a belt 52 of resilient material such for example as rubber or the like or a spring, the said belt serving to provide tension tending to swing the pulley carrying support members bringing the periphery of large pulley 40 into driving contact with the motor shaft 26, and causing the small friction pulley 48 to engage the inner surface of turntable flange 10a.

As has been described the support members or pulley bearing blocks 32 and 34 are pivotally supported, preferably off center, and their pivot pins 28 and 30 are disposed on opposite sides of a line joining said pulley bearing pins 36 and 38 when said combinations of pulleys are in engagement with said driving means and the member to be driven, and the tension exerted by the elastic belt 52 tends to swing or oscillate said members or blocks around their respective pivots 28 and 30 clockwise, and in a direction to engage said driving means and said driven member respectively. By controlling the location of the said pivots of said pulley bearing blocks the angle of said blocks relative to a line joining the centers of said combinations of pulleys or the pulley bearing pins 36 and 38 may be varied. The pulley bearing block 32 is positioned, through placement of its pivot 28, at a lesser angle to said line joining said pulley bearing pins when they are in operative position than the pulley bearing block 34. It will also be noted that since pulley 46 is of larger diameter than pulley 42 the torque exerted on block 34 by resilient belt 52 is greater than the torque exerted on block 32. The contact pressure between large pulley 40 on shaft 36 and motor shaft 26 is thus made less than the contact pressure between small pulley 48 on shaft 38 and the flange 10a of the turntable. Thus the driving shaft 26 is contacted by the apparatus described herein with only a light pressure or load when starting. This is an important advantage particularly when using a shaded pole motor or other AC motor with low starting torque to actuate the apparatus disclosed herein. However, once started, such motors have considerable torque and can be given a substantial load immediately after starting.

It will be noted that the pivoted support members or blocks 32 and 34 are positioned relatively so that before member 34 can cross the line joining the centers of pins 36 and 38, moving in a counterclockwise direction, its shorter arm will strike against the longer arm of pulley bearing block 32, and thus accidental flipping over of the friction roller 38 and its mount, beyond the said line of centers and away from frictional engagement with the turntable, is prevented.

With the motor drive shaft 26 and the pulleys rotating in the direction of the arrows (Figure 1), any increase in resistance to rotation of the turntable 10 i. e. any increase in the load on the drive mechanism described herein, causes the friction pulley 48, and with it its mounting block 34, to move in the direction of the dotted arrow 60, and thus frictional engagement between pulley 48 and the flange of the turntable is increased in proportion to increases in the load. The said increase in frictional engagement reacts to increase the tension on the elastic driving belt 52, and particularly the portion moving toward large pulley 46, and this in turn proportionally increases the contact pressure or frictional engagement between the pulley 40 and motor drive shaft 26 thus producing greater driving force.

In order to prevent accidental lifting of the sleeve 16 from bearing post 12 a screw 54 may be adjustably mounted through the wall of the sleeve with its inner end extending into a groove 56 in the surface of bearing post 12.

Another groove 58 may be provided in the surface of post 12 adapted to receive ball bearings 59 to absorb side thrust and minimize friction between the post 12 and sleeve 16.

The device disclosed herein has the advantages of simplicity, durability and positiveness in action together with the elimination of mechanical parts requiring close tolerances.

It will thus be seen that there has been provided by this invention a method and apparatus in which the various objects hereinabove set forth together with many thoroughly practical advantages are successfully achieved. As various possible embodiments might be made of the mechanical features of the above invention and as the art herein described might be varied in various parts, all without departing from the scope of the invention, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

What we claim is:

1. A power transmitting and speed controlling apparatus comprising, a base, a plurality of pulley bearing blocks, and pivots supported on said base on which said blocks are respectively pivotally mounted, bearing pins supported on said blocks respectively, and a combination of a large and a small pulley mounted for rotation on each of said pins, a source of power adapted to frictionally engage one of the pulleys of one of said combinations of pulleys, a work piece adapted to be frictionally engaged by one of the pulleys of the other of said combinations of pulleys, and a resilient driving belt interconnecting said combinations of pulleys, one combination of said pulleys being mounted adjacent said source of power and the other of said combinations of pulleys being mounted adjacent said work piece, and said combinations of pulleys being mounted on opposite sides of a line joining the bearing pins for said two sets of pulleys, and said resilient belt tending to rotate the bearing blocks for said combinations of pulleys toward said line and in directions tending to bring a pulley of one of said combinations into contact with said source of

power and one of the pulleys of the other of said combinations into contact with the said work piece.

2. A device as claimed in claim 1 wherein said source of power is a vertically disposed rotating drive shaft and the bearing pins for said combinations of pulleys are vertically disposed.

3. A device as claimed in claim 1 wherein the large pulley of one of said combinations engages said source of power and the small pulley of the other of said combinations engages said work piece, and the resilient belt is interconnected between the small pulley of the combination the large pulley of which engages said source of power and the large pulley of the combination the small pulley of which engages said work piece.

4. A device as claimed in claim 1 wherein the bearing block on which is mounted the pulley which engages the work piece is disposed at a greater angle with respect to a line joining the axes for said combinations of pulleys than the bearing block on which is mounted the pulley which engages said source of power.

5. A turntable driving apparatus comprising a drive shaft and a source of power therefor, a turntable and rotatable mounting means therefore, and speed reducing means for receiving power from said drive shaft and transmitting it to said turntable comprising, a plurality of pivoted support members, a shaft carried by each of said members, a large and a small pulley mounted on each of said shafts for rotation in unison thereon, and a resilient driving belt interconnecting the small pulley on one of said shafts with the large pulley on the other of said shafts, the pivots for each of said support members being disposed so that said resilient driving belt swings one of said members to bring the large pulley thereon into frictional engagement with the said drive shaft, and swings the other of said members to bring the small pulley thereon into frictional engagement with the turntable substantially at its periphery.

6. A power transmitting and speed reducing apparatus for driving turntables and the like comprising, a turntable and a mount for rotatably supporting the turntable, a primary source of power, a drive shaft driven thereby, a first pulley and a second pulley mounted for rotation together and pivotally mounted support means for said first and second pulleys, said first pulley being adapted to frictionally engage and to be driven by said drive shaft, said second pulley being smaller than said first pulley, a third pulley and a fourth pulley mounted for rotation together, and pivotally mounted support means for said third and fourth pulleys, said fourth pulley being adapted to frictionally engage said turntable to drive it, said fourth pulley being smaller than said third pulley, and said third pulley being larger than said second pulley, and a resilient driving belt interconnecting said second and third pulleys and tending to rotate said support means to bring said first pulley into frictional engagement with said drive shaft and to bring said fourth pulley into engagement with the turntable substantially at its periphery.

7. A device as claimed in claim 6 wherein the pivots for said support means respectively are off center and divide said support means into arms of unequal length, and said support means are urged by said resilient driving belt acting through said second and third pulleys respectively into positions angularly related to a line joining the centers of rotation of said pulleys.

8. A device as claimed in claim 6 wherein the pivots of said support means respectively are disposed so that the support means for said first and second pulleys is disposed at a lesser angle with respect to a line joining the center of rotation of said first and second pulleys and the center of rotation of said third and fourth pulleys than the support means for said third and fourth pulleys whereby the starting load on said drive shaft, consisting of the frictional engagement between said first pulley and said drive shaft, is less than the starting load on said fourth pulley, consisting of the frictional engagement between said fourth pulley and the turntable.

9. A device as claimed in claim 6 wherein the first and second pulleys are mounted for rotation together on a common axis carried by one of said support means, and said third and fourth pulleys are mounted for rotation together on a common axis carried by the other of said support means, and the axes for said support means are disposed relative to one another and to said drive shaft and to the periphery of said turntable so that when said support means are interconnected by said resilient driving belt the support means for said first and second pulleys will be rotated into a position in which the periphery of said first pulley frictionally engages said drive shaft, and the support means for said third and fourth pulleys will be rotated into a position in which the periphery of said fourth pulley frictionally engages the turntable substantially at its periphery, and increased resistance of the turntable to rotation will increase the frictional engagement between said fourth pulley and said turntable, and said increase will react through said resilient driving belt to increase the frictional engagement between said first pulley and said drive shaft.

10. A device as claimed in claim 6 wherein said drive shaft and the axes for said pulleys are vertically disposed in planes normal to the plane of the turntable.

11. A power transmitting and speed reducing apparatus for driving turntables and the like comprising, a turntable and a mount for rotatably supporting the turntable, a primary source of power, a drive shaft driven thereby, a first pulley and a second pulley mounted for rotation together and pivotally mounted support means for said first and second pulleys, said first pulley being adapted to frictionally engage and to be driven by said drive shaft, said second pulley being smaller than said first pulley, a third pulley and a fourth pulley mounted for rotation together, and pivotally mounted support means for said third and fourth pulleys, said fourth pulley being adapted to frictionally engage said turntable to drive it, said fourth pulley being smaller than said third pulley, and said third pulley being larger than said second pulley, and a resilient driving belt interconnecting said second and third pulleys and tending to rotate said support means to bring said first pulley into frictional engagement with said drive shaft and to bring said fourth pulley into engagement with the turntable substantially at its periphery, the pivots for said support means respectively being off center and dividing said support means into arms of unequal length, said support means being urged by said resilient driving belt into positions angularly related to a line joining the center of rotation of said first and second pulleys to the center of rotation of said third and fourth pulleys, the shorter arm of each of said support means being longer than the distance between the pivots of said sup-

port means whereby the extent either of said support means may rotate relative to the other is limited by contact of the short arm of one support member with the long arm of the other support member.

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