L. P. SHARPLES.

FLEXIBLE SPINDLE COUPLING.

APPLICATION FILED NOV. 6, 1919.

1,373,206. Patented Mar. 29, 1921.

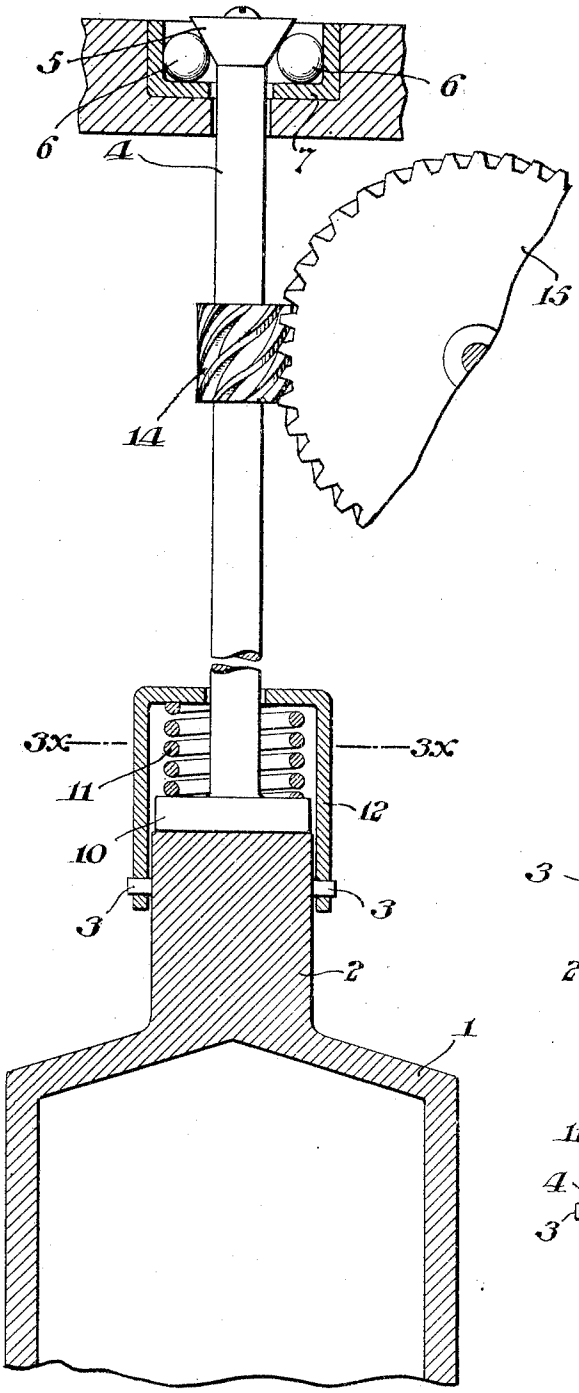


Fig. 1.

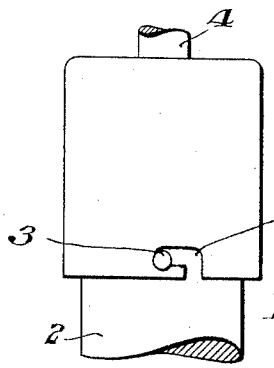


Fig. 2.

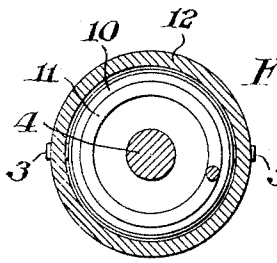


Fig. 3.

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UNITED STATES PATENT OFFICE.

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FLEXIBLE SPINDLE-COUPLING.

1,373,206. Specification of Letters Patent. Patented Mar. 29, 1921.

Application filed November 6, 1919. Serial No. 336,002.

To all whom it may concern:

Be it known that I, LAURENCE P. SHARPLES, a citizen of the United States, residing at West Chester, in the county of Chester and State of Pennsylvania, have invented a Flexible Spindle-Coupling, of which the following is a specification.

This invention relates primarily to the spindle couplings of centrifugal machines having bowls suspended and driven therethrough, but it will be understood that it is intended for use wherever its functions are applicable.

In the operations of centrifugal machines having bowls suspended by spindles through which they are driven at high speeds it is difficult to secure the desired alinement of the center of gravity of the bowl with the axis of the spindle, due to various causes such as unbalanced bowls and parts that are not true. Heretofore this difficulty and its attendant evils have been alleviated by the use of comparatively long and limber spindles for suspending and revolving the bowls. But an injury, such as the bending of a spindle or the deformation of a coupling face, affects the operation and may cause the bowl and spindle to vibrate and run hard.

It is a primary object of this invention to eliminate the foregoing defects of the constructions heretofore known and to provide means of simple, sturdy and readily manipulated character, whereby the automatic alinement of the center of gravity of the bowl with the axis of the spindle is effected notwithstanding inaccuracies of workmanship, deformation of the mechanism and other causes.

The present improvements effect the desiderata by permitting the use of a comparatively short, stiff spindle with a coupling which requires no great accuracy of construction, is easier to couple and is less liable to get out of order, while providing the desired means for permitting the bowl to take its natural course without straining the mechanism.

The characteristic features of the invention will be fully understood from the following description and the accompanying drawings in illustration thereof.

In the drawings, Figure 1 is a broken vertical sectional view of a construction embodying my improvements; Fig. 2 is a side elevation of the coupling, and Fig. 3 is a sectional view taken on the line $3^{\times}$—$3^{\times}$ of Fig. 1.

In the form of the invention illustrated, the bowl 1 is provided with a neck in the form of a stub-spindle 2 having the diametrically disposed studs 3 thereon.

A spindle 4 has at its top a conical bearing 5 which rests on the balls 6 carried by cup 7, providing a thrust bearing. A radial bearing may be provided for the spindle if desired. The bottom of the spindle has thereon a disk 10 whose bottom face engages the top face of the stub-spindle 2, a coil spring 11 being supported by the disk on the spindle.

A coupling member 12, in the form of a housing, is mounted on the spindle 4, so as to move freely with the relation thereto, and is provided with the diametrically disposed angular slots 13 for engaging it with the studs 3 as in a bayonet joint; the member 12 inclosing the engaging parts of the members 2 and 10 as well as the member 11, on which it rests.

A worm 14 on the spindle 4 is engaged by a spiral gear 15, whereby the spindle is revolved and caused to drive the bowl through the coupling due to the friction caused by the spring 11.

The bowl and spindle are usually not in exact alinement when at rest because of imperfections of construction or untrue relations as if a slight bur or dirt between the surfaces of the parts 2 and 10 throw them into angular relation. But in the operation of the bowl when it has attained sufficient speed, the force exerted thereby will effect the desired righting action so that its center of gravity axis is brought into alinement with the axis of the driving spindle, the force exerted by the bowl having compressed the spring so as to permit this automatic alinement and the elimination of the otherwise objectionable effects due to operating the bowl with its axis in angular relation to the axis of the spindle.

From the above, it will be apparent that the spring 11 normally holds the driving surface at the lower face of the disk 10 in engagement with the face of the bowl, and therefore, the spring performs a double function of suspending the bowl, and holding the driving faces in contact. If either of these driving faces become battered or burred, or any foreign substance lodges between the two, which throws the center of gravity of

the bowl out of alinement with the axis of the spindle, the spring will yield to allow the center of gravity of the bowl to move back into a line containing the axis of the spindle, and thus bring about the automatic alinement referred to above.

Having described my invention, I claim:

1. The combination of a suspended spindle having a driving surface, a bowl having a surface contacting with said driving surface whereby the bowl is driven through said spindle, and means for yieldingly holding said surfaces in contact whereby said bowl is permitted to aline its center of gravity with the axis of the spindle.

2. The combination of a suspended spindle, a bowl, and flexible coupling means comprising a spring supported by said spindle for suspending and revolving said bowl.

3. The combination of a suspended spindle, a bowl and coupling means supported by said spindle for suspending and revolving said bowl, said means comprising a flexible member supported by said spindle, a coupling member supported by said flexible member and means for detachably connecting said coupling member with said bowl.

4. The combination of a suspended spindle provided with a bearing member having a face, a bowl provided with a stub-spindle having a face engaging the face of said bearing member, a spring supported by said bearing member, and a coupling member supported by said spring and connected with said stub-spindle.

5. The combination of a suspended spindle provided with a bearing member, a bowl provided with a stub-spindle having studs thereon, a spring supported by said bearing member, and a coupling member supported by said spring and having angular slots adapted for engaging said studs.

6. The combination of a spindle having a driving surface at its lower end, a bowl having a surface at its upper end adapted to engage said driving surface whereby the bowl is driven from said spindle, a spring, and means associated therewith whereby said spring suspends said bowl and normally forces said surfaces into contact, said spring yielding to permit the bowl to aline its center of gravity with the axis of the spindle.

7. The combination of a spindle having a disk at its lower end formed with a horizontal lower surface, a bowl having a horizontal surface at its upper end adapted to engage the horizontal surface on said disk whereby the spindle drives said bowl, a spring, and means associated with said spring whereby said bowl is suspended and the surface thereon held in driving contact with the surface of the disk, said spring yielding to permit the bowl to aline its center of gravity with the axis of said spindle.

8. The combination of a spindle having an enlargement at its lower end forming a shoulder at its upper face and a driving surface at its lower face, the bowl having a surface conforming to and adapted to engage the driving surface of the enlarged end of the spindle, a spring resting on the shoulder of said spindle, a cap encircling the spindle and forming an abutment for said spring, and means for connecting the cap to the bowl, said spring being of sufficient tension to suspend the bowl and hold the surface of the bowl in contact with the driving surface of the spindle and to yield to permit the bowl to aline its center of gravity with the axis of the spindle.

Signed at West Chester, in the county of Chester and State of Pennsylvania, this 3rd day of November 1919.

LAURENCE P. SHARPLES.