July 7, 1931. W. C. STARKEY ET AL 1,813,095

SEPARATOR DRIVING MECHANISM

Filed May 31, 1928

Fig. 1.

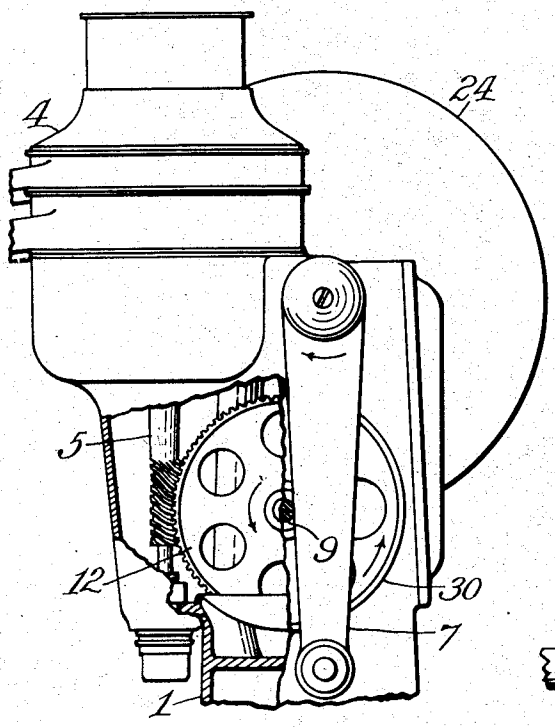


Fig. 2.

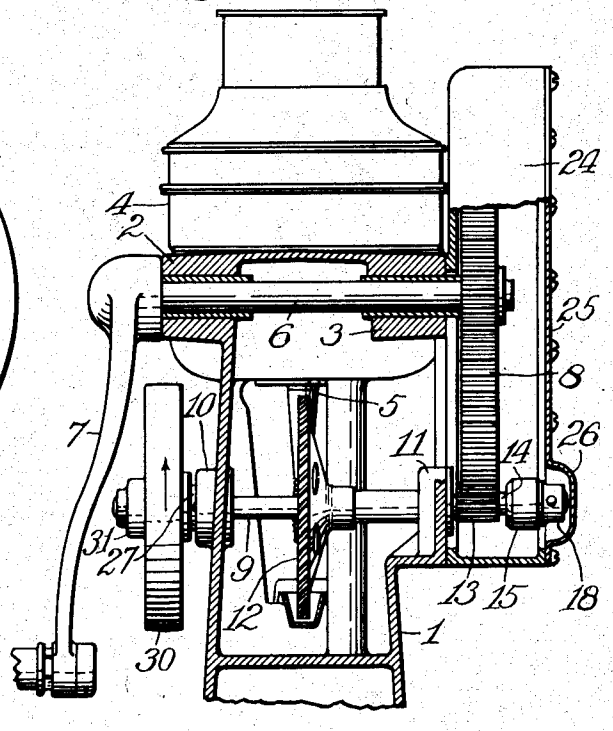


Fig. 3.

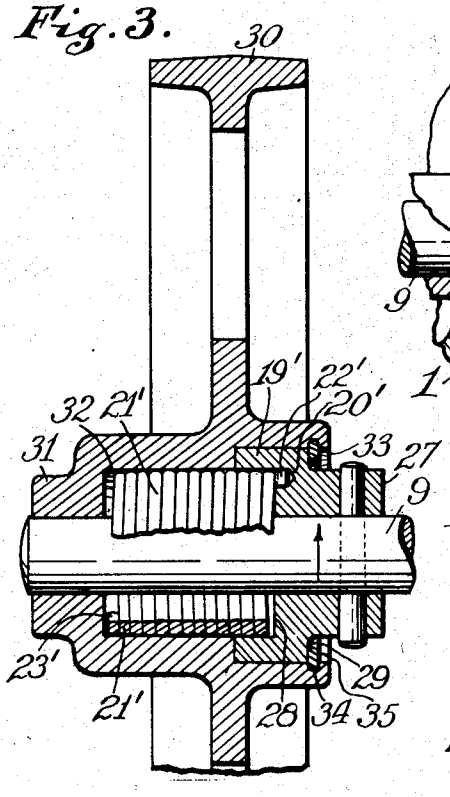


Fig. 4.

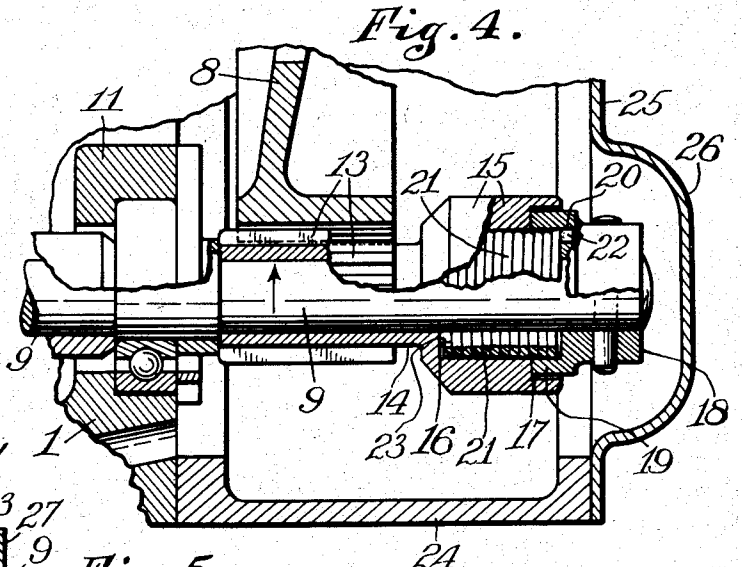
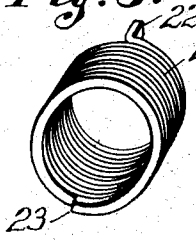


Fig. 5.



INVENTORS:
William C. Starkey,
Dalmar T. Brownlee,
BY
E. T. Silvius,
ATTORNEY.

Patented July 7, 1931 1,813,095

UNITED STATES PATENT OFFICE

WILLIAM C. STARKEY AND DALMAR T. BROWNLEE, OF INDIANAPOLIS, INDIANA, ASSIGNORS TO L. G. S. DEVICES CORPORATION, OF INDIANAPOLIS, INDIANA, A CORPORATION OF INDIANA

SEPARATOR DRIVING MECHANISM

Application filed May 31, 1928. Serial No. 281,758.

This invention relates to mechanism designed for driving or turning rotary shafts and has reference more particularly to means for transmitting motion from one to another shaft.

An object of the invention is to provide noiseless automatic transmission mechanism of such construction as to be adapted to operate without causing shocks due to sudden starting of one element by another.

Another object is to provide improved driving mechanism for cream-separators which shall be adapted to permit hand-power operation without endangering the operator, and which shall be efficient and not costly to manufacture.

A further object is to provide improved separator driving mechanism which shall be of such construction as to be adapted to be operated either by an engine or motor or by hand-power, and intermittently by either at will and which shall be adapted to be durable and economical in use.

With the above-mentioned and other objects in view, the invention consists in improved driving mechanism having silent clutching apparatus enabling one rotary element to smoothly start and rotate another rotary element in one direction and permitting it to be rotated in the same direction by another source of energy; and further, the invention consists in the parts and combinations and arrangements of parts as hereinafter particularly described and further defined in the appended claims.

Referring to the accompanying drawings,—Figure 1 is an elevation, partially broken away, of a popular type of centrifugal separator having the improved driving mechanism incorporated therewith; Fig. 2 is a vertical sectional elevation approximately at right angles to the preceding figure; Fig. 3 is an enlarged sectional detail showing improved driving wheel construction and shaft connections whereby either one may be clutched to the other; Fig. 4 is an enlarged sectional detail showing improved mechanism whereby a shaft may be rotated in one direction by hand-power and permitted to be rotated in the same direction by motor-power; and Fig. 5 is a perspective view of a spring clutch device which preferably is incorporated in the invention.

Similar reference characters in the various figures of the drawings indicate corresponding elements or features of construction herein referred to in detail.

The improved driving mechanism is well suited for separator driving and is illustrated and described in connection therewith, and may be advantageously applied to various types of machines.

In the drawings the numeral 1 indicates generally the frame of a separator, and on the upper portion of the frame a pair of journal bearings or boxes 2 and 3 and a conventional separator vessel 4 having an actuating gear shaft or spindle 5, a crank shaft 6 being mounted in the bearings and having a hand-crank 7 fixed thereto. A large spur toothed gear wheel 8 is arranged on the crank shaft and for the purposes of the present invention is rigidly secured thereto, to drive a gear shaft or countershaft 9 rotatably mounted in suitable journal bearings 10 and 11 below the other bearings above-mentioned, the shaft 9 having a gear wheel 12 thereon of large diameter which conventionally rotates the shaft 5 at relatively higher speed than that of the shaft 9, the latter shaft being sufficiently long to extend through and beyond its supporting bearings.

The improved mechanism includes a spur toothed pinion 13 which is rotatively mounted on the shaft 9 and in mesh with the wheel 8, and it has a side hub portion 14 to which a hollow cylindrical clutch member 15 is fixed, preferably integrally therewith, the member 15 having a true bore 16 therein and also a counterbore 17. A collar 18 is rigidly secured to the shaft 9 and has a hollow cylindrical portion 19 that is received in the counterbore, the internal diameter of the portion 19 being approximately equal to the diameter of the bore 16 to receive a frictional spring clutch, the portion 19 being suitably bored for the required purpose and having a pocket 20 in the bottom of the bore. A coiled spring clutch 21 is arranged in the bore 16 and extends into the portion 19, being provided with

a lug 22 on one of its ends that is received in the pocket 20, the spring clutch having a plain opposite end 23. The spring clutch is only sufficiently less in diameter than the bore 16 to permit smooth movement in one direction and diametrically expands automatically in the opposite direction to clutch to the member 15 as the member 15 is turned in the direction tending to unwind the spring clutch.

The separator frame preferably has a gear casing body 24 thereon to inclose the wheel 8 and the pinion 13 and also the clutch mechanism, and preferably it has a front part 25 having an off-set portion 26 covering the outer end of the shaft 9 and the collar 18.

For the purpose of enabling the separator, or more specifically the shaft 9, to be driven by a motor a collar 27 is rigidly secured to the shaft at a suitable distance from its opposite end, being adjacent to the journal box 10 and has a hollow cylindrical or annular portion 19′ provided with a bore 28 and a pocket 20′ in the bottom of the bore, the bore being adapted to receive a portion of a spring clutch 21′ with a lug on one end that is received in the pocket, the clutch having a plain end 23′. The portion 19′ affords a shoulder 29 for guiding purposes. A pulley 30 is arranged to be belted to an electric motor and has a hub portion 31 rotatively supported on the shaft 9, the major portion of the hub having a true bore 32 that receives the spring clutch 21′ having a lug 22′ projecting in the pocket 20′. The springs clutch 21′ is only slightly less diametrically than the bore 32 so as to operate as a clutch only when the pulley is turned in one direction. The inner portion of the pulley hub has a counterbore 33 therein receiving the annular portion 19′ of the collar, so that the hub has a rotary bearing on the collar, there being a groove 34 in the counterbore into which a retaining ring 35 is sprung so as to be in contact with the shoulder 29.

In practical use the separator may be operated by means of the hand-crank 7, it being preferred to rotate the shaft 6 directly by a motor. The wheel 8 turns the pinion 13, resulting in the member 15 being frictionally engaged with the spring clutch 21 which turns the collar 18 and thereby the gear shaft 9; and assuming that the pulley 30 is held at rest by a belt connected with a small motor, the shaft and the spring clutch freely turns in the pulley hub. The electric motor may be too small to initially start the separator, in which case the shaft 9 is initially started by hand-power as explained, after which the motor may be started so that the pulley shall be automatically clutched to the shaft 9 and drive it without rotating the shaft 6, the shaft automatically becoming unclutched from the pinion 13 and permitting the wheel 8 and the crank shaft to stop.

What is claimed is:

1. A separator driving mechanism including two identical coil spring friction clutches spaced apart in tandem arrangement, a horizontal gear shaft loosely arranged in the clutches and rotatably supported, two collars rigidly secured to the shaft at corresponding ends of the clutches respectively and connected thereto, a rotary crank shaft and a toothed gear wheel rigidly secured thereto, a toothed pinion rotatively supported on the shaft gear in mesh with the gear wheel and provided with a hub portion having a bore receiving the major portion of one of the clutches to frictionally engage the clutch upon rotation in one direction, and a pulley rotatably supported also on the shaft and provided with a hub portion having a bore receiving the major portion of the remaining one of the clutches to frictionally engage the clutch upon rotation in one direction.

2. In a separator driving mechanism, the combination with a high speed rotary gear shaft, of a drive wheel rotatably guided on the shaft and provided with an annular smooth face friction clutch member, a collar rigidly secured to the shaft and having a bore therein diametrically larger than the shaft and a pocket at the bottom of the bore, and a coil spring friction clutch device partially arranged in said bore and having a lug extending into said pocket, the device being guided by the clutch member and automatically engaging its smooth face upon rotation of the drive wheel in one direction.

3. In a separator driving mechanism, the combination of a rotary gear shaft having two separate annular collars separately secured rigidly thereto, a toothed pinion and a pulley rotatably guided on the shaft in proximity to the collars respectively and having each a smooth-bore friction clutch portion, a driving gear wheel in constant mesh with the pinion and two coil spring friction clutch devices secured to the collars respectively and guided in said smooth-bore portions respectively to automatically and silently engage said portions alternatively upon rotation of the pinion or the pulley.

4. In a separator, the combination, with a separator frame having two upper journal bearings spaced apart and two lower journal bearings spaced apart below the upper bearings respectively, of a gear shaft rotatably mounted horizontally in the lower bearings and extending therethrough, a worm gear fixed to said shaft between its bearings, a spur tooth pinion rotatably mounted on the gear shaft adjacent to the outer side of one of its supporting bearings, the pinion having an annular side hub portion extending outwardly, the outer end of the hub portion having a counterbore, a collar rigidly secured to the gear shaft and having a hollow cylindrical portion arranged to turn in said counterbore,

a clutch device inclosed in said cylindrical collar portion and said annular side hub portion and co-operating therewith, a crank shaft rotatably mounted in said upper bearings and extending therethrough, a spur tooth gear wheel secured to the crank shaft at the outer end of one of its supporting bearings and meshing with said pinion, and a crank arm secured to the crank shaft at the outer side of the opposite one of its supporting bearings.

5. In a separator driving mechanism, the combination, with a separator frame and a gear shaft rotatably supported thereby, of a collar rigidly secured to the shaft and having a hollow cylindrical portion provided with a guiding shoulder, a pulley having a hub rotatably supported at one end on the shaft, the remaining portion of the hub having a relatively large bore and also a counterbore receiving and guided by the cylindrical portion of the collar, said counterbore having a groove therein adjacent to said shoulder, a retaining ring arranged in said groove in contact with said shoulder, and a silent friction clutch device inclosed in said cylindrical collar portion and in said hub bore and co-operating therewith to rotate the shaft.

6. In a separator, the combination of an upright frame and a bowl thereon with a vertical spindle having support in the frame, a countershaft rotatively supported in the frame, a worm gear fixed to the countershaft and meshing with the spindle, a toothed pinion rotatable on the countershaft adjacent to one end thereof, a crank shaft supported by the upper portion of the frame, a drive gear secured to the crank shaft and meshing with the pinion, a noiseless friction clutch on the countershaft operable to connect the countershaft to the pinion, a belt drive pulley arranged on the countershaft adjacent to the opposite end thereof, a noiseless friction clutch on the countershaft operable to connect the countershaft to the pulley, and a casing secured to the frame and inclosing the drive gear and the pinion and also the pinion clutch.

In testimony whereof, we affix our signatures on the 22nd day of May, 1928.

WILLIAM C. STARKEY.
DALMAR T. BROWNLEE.