No. 724,103. PATENTED MAR. 31, 1903.

M. L. HOYT.

DRIVING MECHANISM FOR SPINDLES OF CENTRIFUGAL SEPARATORS.

APPLICATION FILED NOV. 18, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

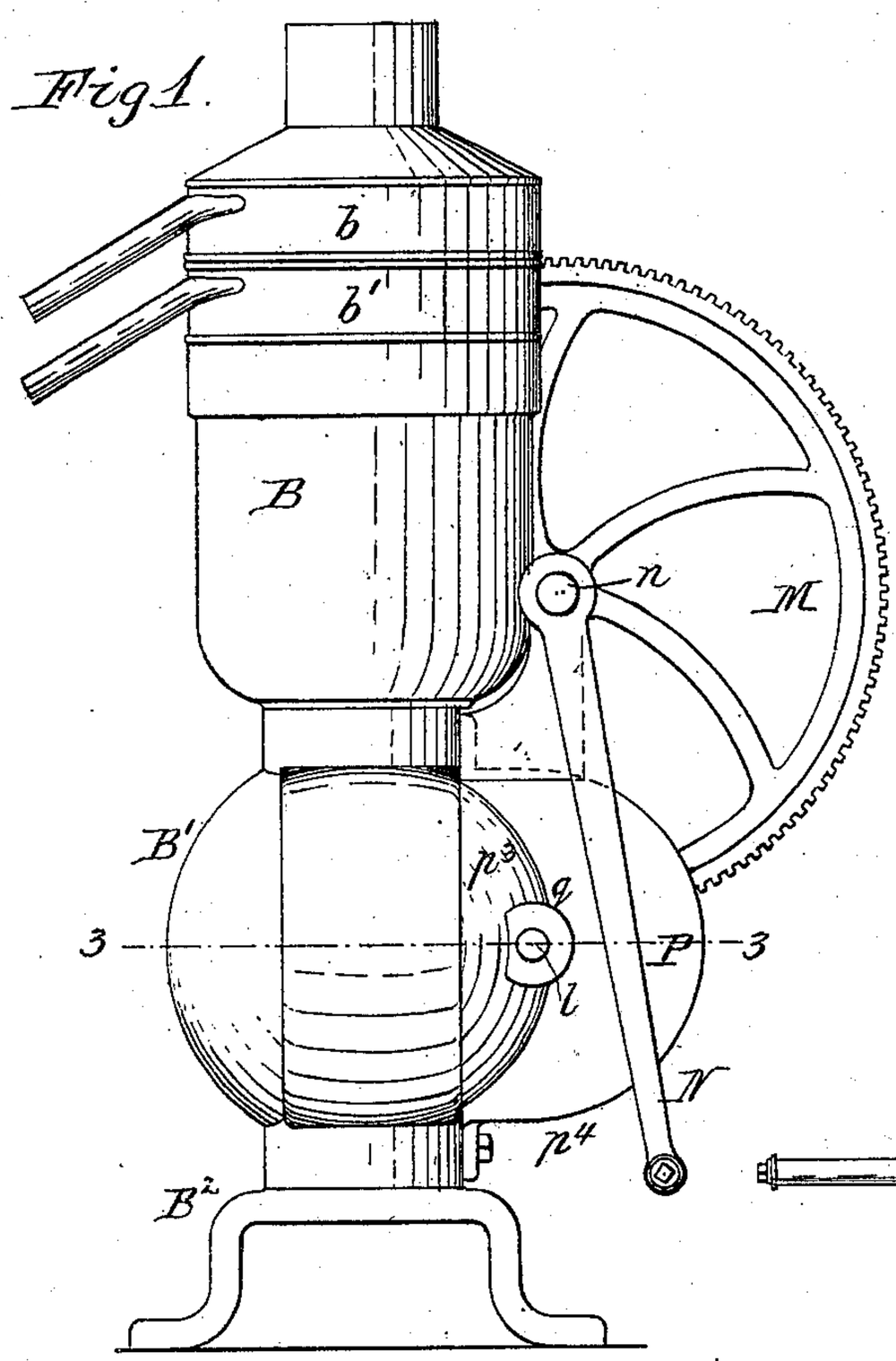


Fig. 2.

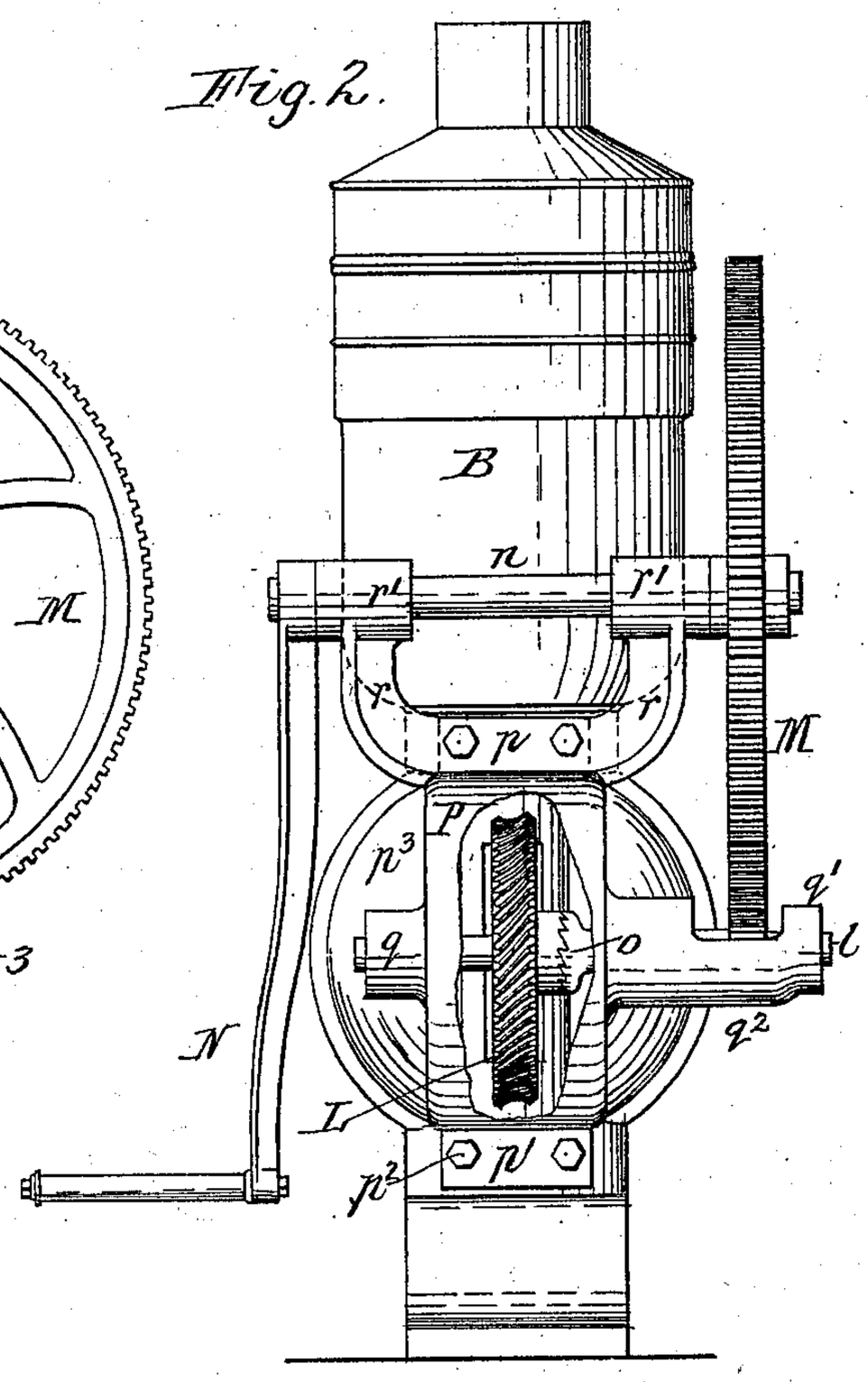


Fig. 3.

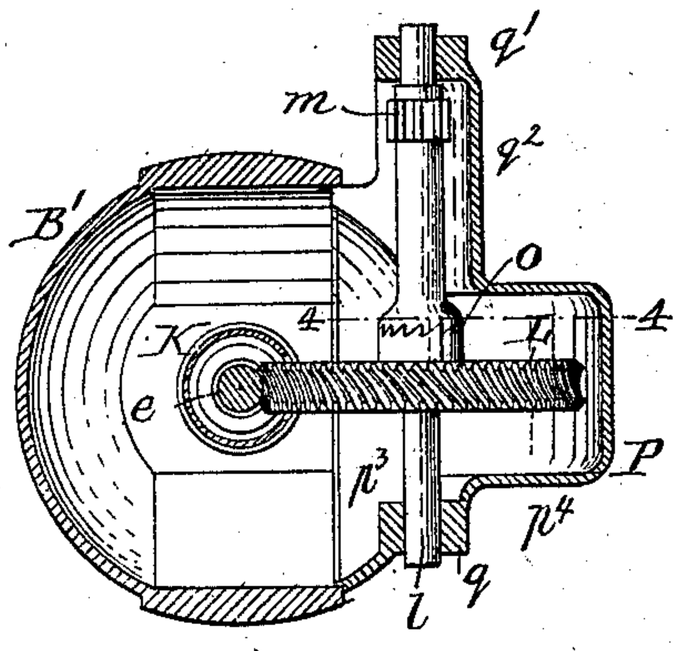


Fig. 4.

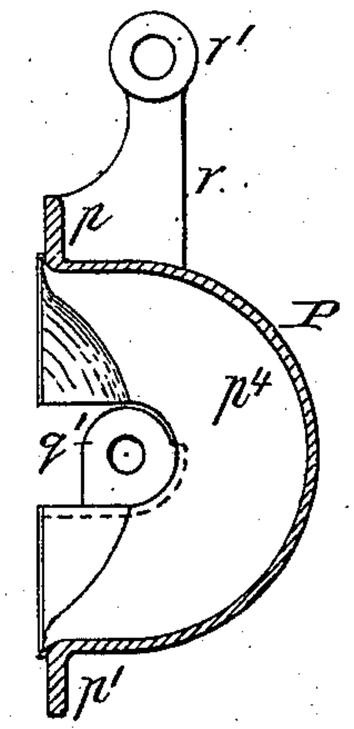
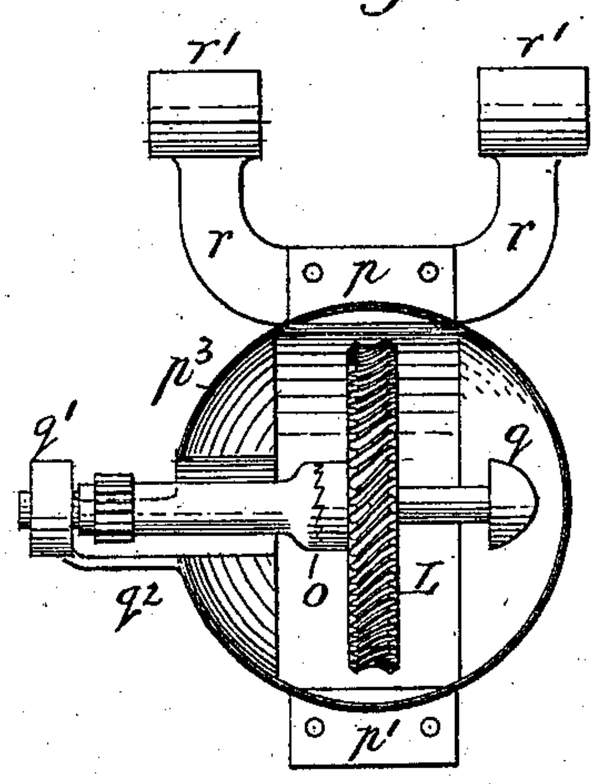


Fig. 5.



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APPLICATION FILED NOV. 18, 1901.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 6.

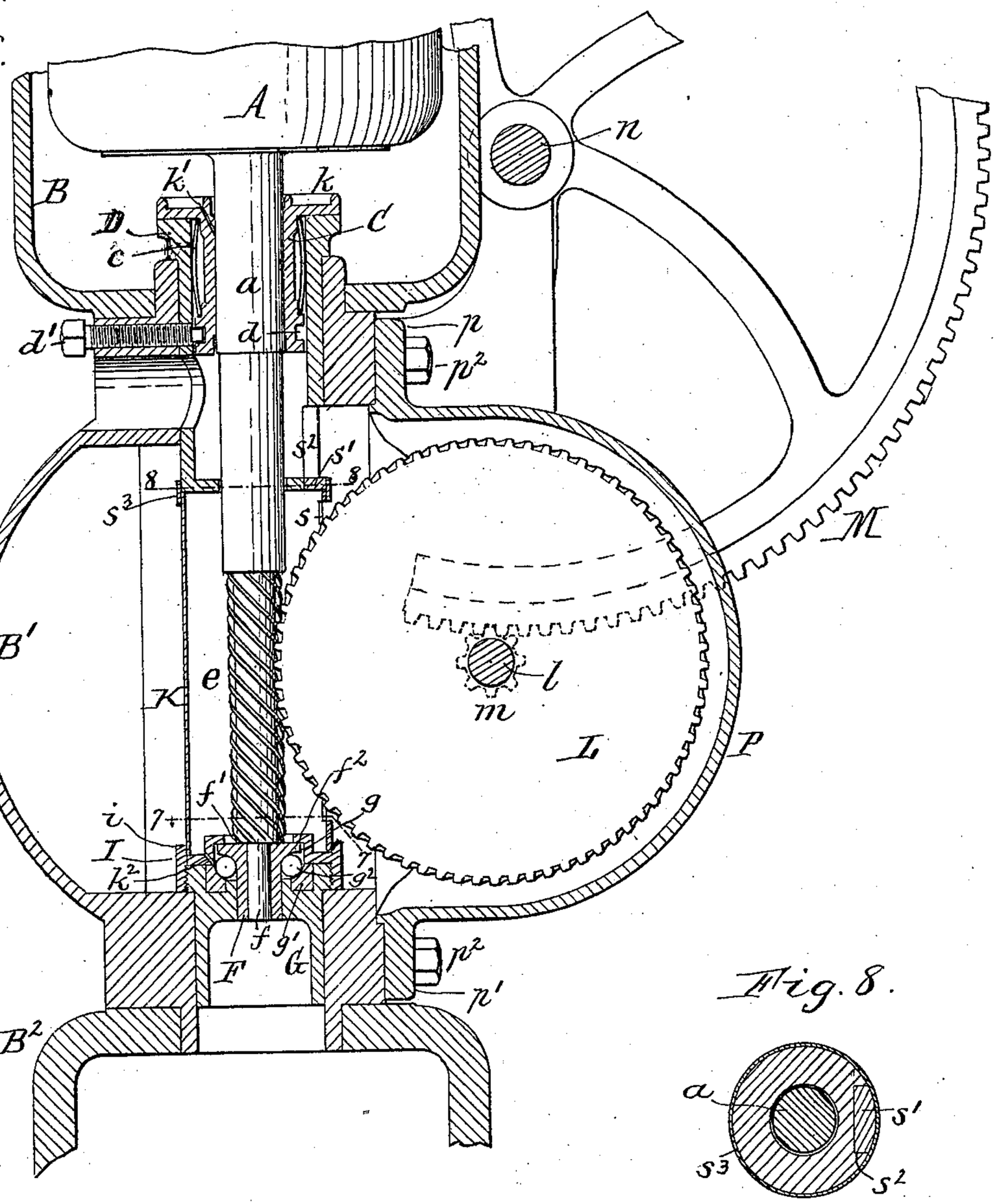
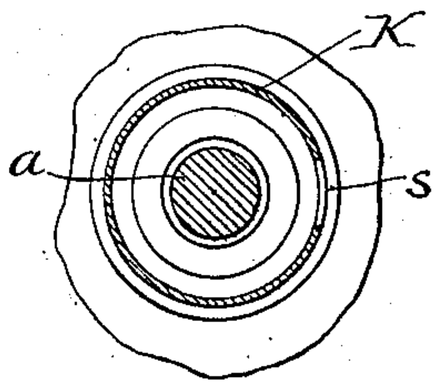


Fig. 8.

Fig. 7.



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UNITED STATES PATENT OFFICE.

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DRIVING MECHANISM FOR SPINDLES OF CENTRIFUGAL SEPARATORS.

SPECIFICATION forming part of Letters Patent No. 724,103, dated March 31, 1903.

Application filed November 18, 1901. Serial No. 82,683. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW L. HOYT, a citizen of the United States, and a resident of Littlefalls, in the county of Herkimer and State of New York, have invented a new and useful Improvement in Driving Mechanism for Spindles of Centrifugal Separators, of which the following is a specification.

This invention relates to centrifugal separators, particularly the driving mechanism of centrifugal creamers which are provided with a hand-actuated mechanism for driving the spindle. In the type of hand-driving mechanisms most commonly employed the spindle is provided with a steep worm, which is operated by a worm-wheel secured to a horizontal intermediate or countershaft. The latter is provided with a pinion which meshes with a gear-wheel on the horizontal driving-shaft to which the hand-crank is attached.

The principal object of my invention is to support the driving-shaft and the intermediate or counter shaft on a common support in such manner that these shafts and the gear-wheels which they carry can be removed, with their support, from the frame of the separator without disturbing the shafts and gear-wheels, whereby these parts retain their proper relative position when removed from the frame of the machine and can be readily and quickly replaced in the machine without requiring special adjustment.

Another object of the invention is to provide simple means for confining the oil which flows along the spindle from the upper to the lower bearing.

In the accompanying drawings, consisting of two sheets, Figure 1 is a side elevation of a centrifugal creamer provided with my improvements. Fig. 2 is a rear elevation of the machine at right angles to Fig. 1 with part of the gear-casing broken away. Fig. 3 is a horizontal section through the frame and gear-casing in line 3 3, Fig. 1. Fig. 4 is a sectional elevation of the gear-casing detached from the frame in line 4 4, Fig. 3. Fig. 5 is a face view of the driving mechanism detached from the frame. Fig. 6 is a sectional elevation of the driving mechanism on an enlarged scale. Figs. 7 and 8 are horizontal sections in lines 7 7 and 8 8, Fig. 6, respectively.

Like letters of reference refer to like parts in the several figures.

A represents the bowl or drum of the separator, and *a* the spindle, which is secured to the same in any suitable manner.

The supporting-frame may be of any suitable construction, that shown in the drawings being composed of an upper bowl-shaped part B, in which the bowl A is arranged, an intermediate spherical part B′, in which the driving device is arranged, and a lower part B^2, having the form of a stand or foot of greater or less height.

b b′ represent the usual receptacles mounted upon the frame around the top of the bowl for receiving the separated liquids, such as cream and skim milk.

C, Fig. 6, represents the upper or neck bearing, which supports the spindle near the bowl, as usual, and which is constructed in any suitable or well-known manner. As shown in the drawings, this neck-bearing is supported in the upper portion of a sleeve D, which is arranged in the upper portion of the intermediate spherical part B′ of the frame. The neck-bearing is mounted in the sleeve D in such manner that the bearing can move laterally to a certain extent, and for that purpose a spring *c*, of metal or rubber, is interposed between the bearing and the sleeve. The bearing is preferably provided near its lower end with an annular groove *d*, into which projects a fastening-bolt *d′*, which is arranged horizontally in the frame and projects through an opening in the sleeve into the groove of the bearing. This bolt holds the bearing against upward movement in the sleeve and secures the latter to the frame.

e represents the usual worm or steep multiple screw-thread, which is formed on the lower portion of the spindle. The latter is supported at its lower end in a bearing of any usual or suitable construction. The lower bearing which is shown in the drawings and which is preferred is constructed as follows: The spindle is provided at its lower end with a reduced portion *f*, which is surrounded by a flanged sleeve F, upon which the spindle

rests by the shoulder f' at the upper end of its reduced portion f. The flange f^2 at the upper end of the sleeve F projects outwardly beyond the side of the spindle and is provided on its under side with a ball-cone g.

G is a step-bearing which is supported in the lower portion of the intermediate frame part B′ and which contains in its upper portion a ball-cup g'.

g^2 represents balls which are interposed between the cup and the cone g.

I represents a retaining-cap, which is secured to the projecting upper end of the step-bearing G, preferably by a screw-thread, as shown. This cap has an upwardly-projecting marginal flange i, which confines the lower end of a slotted tube K, which is preferably interposed between the cap and the lower end of the sleeve D for confining the oil which flows along the spindle. As shown in Fig. 6, the neck-bearing is provided at its top with a depressed annular oil-receptacle k, from which an oil-duct k' leads to the inner surface of the bearing. Below the neck-bearing the spindle is practically inclosed by the sleeve D and the tube K. Any oil which reaches the inner side of the sleeve and tube flows down on these parts and is caught by the retaining-cap I and conducted from the latter through an oil-duct k^2 to the ball-bearing.

L represents the worm-wheel, which meshes with the worm e on the spindle and which is secured to the horizontal intermediate or countershaft l. m is a pinion which is secured to this intermediate or counter shaft l, and M is the gear-wheel, which is secured to the driving-shaft n and which meshes with the pinion m. N is the hand-crank secured to the shaft n. These shafts and gear-wheels are constructed and arranged in the usual way for imparting the desired speed to the spindle, and a ratchet-clutch o is preferably arranged in the train of gearing in the usual way, so that the hand-crank and its shaft are coupled with the worm-wheel only on the forward movement of the crank.

P represents the casing, which incloses the worm-wheel and which is fitted against the open rear side of the intermediate frame part B′. When this frame part is spherical in form, as shown in the drawings, its open rear side, to which the casing P is fitted, is circular in outline, and the face or front side of the casing is correspondingly circular, as shown in Fig. 5. The casing is provided at its upper and lower ends with flanges p p', through which pass the fastening-bolts p^2, by which the casing is secured to the rear side of the frame. The front portion p^3 of the casing, which is adjacent to the frame part B′, is spherical in form and forms a continuation of the spherical portion B′ of the frame, as indicated in Fig. 3, while the rear portion p^4 of the casing has upright flat sides and is curved concentric with the worm-wheel. The intermediate or counter shaft l is journaled at one end in a bearing q, formed on one side of the casing, and at the other end in a bearing q', formed at the end of a horizontal arm q^2, which projects laterally from the casing underneath the intermediate shaft and the gear-pinion secured thereto, this bearing q' being arranged on the outer side of said pinion. The gear-casing P is provided with arms r, projecting laterally and upward from the upper flange p of the casing and provided at their upper ends with bearings r', in which the crank or driving shaft n is journaled. The driving-shaft is thereby supported in the same detachable support in which the intermediate shaft is supported, whereby these shafts and the gear-wheels mounted thereon retain their relative arrangement undisturbed in applying or removing the driving mechanism and all liability of any change in the relative arrangement of these parts is avoided. On attaching this support to the frame of the machine both shafts are properly supported on the machine and the worm-wheel is caused to mesh with the worm of the spindle. Upon removing the gear-casing, which forms the support for these shafts and gear-wheels, the entire driving mechanism, with the exception of the spindle, is removed bodily from the machine, leaving the interior of the spherical frame part B′ and the lower part of the spindle open to access. If desired, a steam-turbine driving mechanism can then be substituted for the hand mechanism, and when the latter is to be restored this is readily done without requiring any adjustment of the removed parts among themselves, as the detachable casing holds all of these parts in their proper relative position. By removing the hand mechanism from the machine the frame of the latter is not in any way disturbed, but remains intact and ready to receive a turbine or other driving mechanism. The machine is thereby rendered suitable for use with a hand driving mechanism or some other driving mechanism, as circumstances may require.

The tube K is provided on its rear side with an upright slot or narrow opening s, Figs. 6 to 8, of sufficient size to allow the worm-wheel to project through the same and to mesh with the worm. The slot of this sleeve is properly registered with the worm-wheel by any suitable device, preferably by that shown in the drawings, which consists of a lug s', formed on the upper end of the tube and entering a notch or recess s^2 in the lower rear side of the depending sleeve D. The upper end of the tube K is centered on the lower end of the sleeve D by a collar s^3, which surrounds the latter, as shown in Fig. 6. The lug s' is formed on the inner side of this collar and projects into the notch of the sleeve, and this notch is preferably extended upwardly to form a slot similar to that formed in the rear side of the tube, as shown. Upon releasing the sleeve D and raising it sufficiently to clear the upper end of the tube K the latter can be removed when the spindle has been withdrawn. Any other

suitable means for securing the proper position of the tube relative to the sleeve D may, however, be employed.

I claim as my invention—

1. The combination of a driven spindle, a supporting-frame in which the spindle is journaled, a support for the driving mechanism which is detachably secured to said supporting-frame, a driving-shaft and an intermediate shaft both mounted in said detachable support, and gears connecting said shafts and spindle, substantially as set forth.

2. The combination of a driven spindle provided with a driving-worm, a supporting-frame in which the spindle is journaled, a support for the driving mechanism which is detachably secured to said supporting-frame, a horizontal crank-shaft journaled in said detachable support, a horizontal intermediate shaft journaled in said detachable support below said crank-shaft, gears connecting said shafts, and a worm-wheel secured to said intermediate shaft and meshing with the worm on the spindle, substantially as set forth.

3. The combination of a driven spindle provided with a driving-worm, a supporting-frame in which the spindle is journaled and which incloses the same but is open on its side, a gear-casing detachably secured to the open side of said frame, a horizontal crank-shaft journaled in bearings on said gear-casing, a horizontal intermediate shaft journaled in side bearings on said gear-casing, gears connecting said shafts, and a worm-wheel which is secured to said intermediate shaft within said casing and meshes with said worm, substantially as set forth.

4. The combination of a driven spindle provided with a driving-worm, a supporting-frame in which the spindle is journaled and which incloses the same but is open at one side, a gear-casing which is detachably secured to the open side of said frame and completes the inclosure, upper bearings formed on said casing and projecting above the same, a horizontal crank-shaft journaled in said upper bearings, lateral bearings formed on both sides of said casing, an intermediate shaft journaled in said lateral bearings, gears connecting said shafts, and a worm-wheel which is secured to said intermediate shaft within said casing and meshes with said worm, substantially as set forth.

5. The combination of a spindle, means for driving the same, a supporting-frame, a stationary sleeve supported in said frame, an upper spindle-bearing arranged in said sleeve, a lower spindle-bearing arranged in said supporting-frame, and an inclosing tube arranged around the spindle between said sleeve and the lower bearing, substantially as set forth.

6. The combination of a spindle, means for driving the same, a supporting-frame, a stationary sleeve supported in said frame, an upper spindle-bearing arranged in said sleeve, a lower spindle-bearing arranged in said supporting-frame, a tube surrounding the spindle between said sleeve and the lower bearing and having an upright slot for the driving-gear, and means whereby said tube is prevented from turning, substantially as set forth.

Witness my hand this 15th day of November, 1901.

MATTHEW L. HOYT.

Witnesses:
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HARVEY FELDMEIER.