S. H. HALL.

CENTRIFUGAL MACHINE.

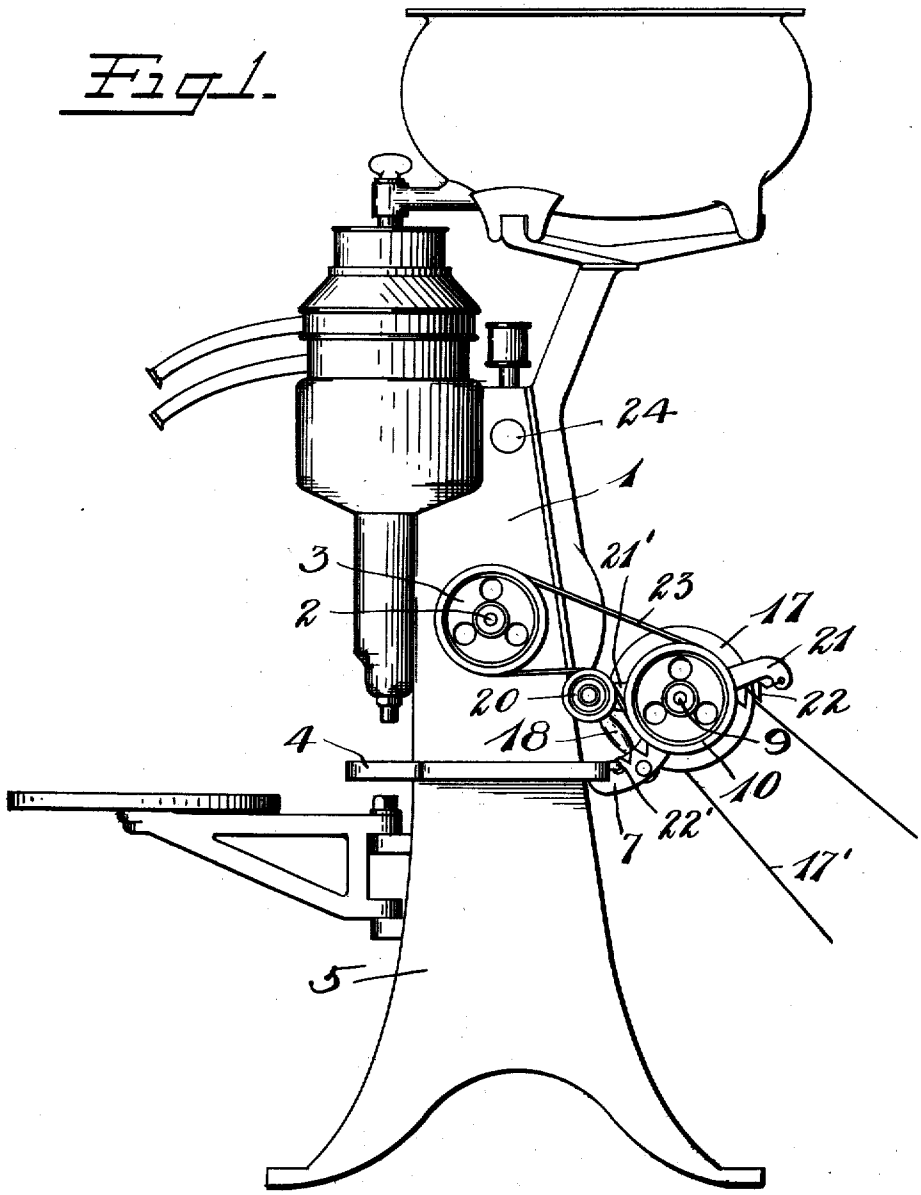
APPLICATION FILED MAR. 2, 1914.

1,156,285.

Patented Oct. 12, 1915.

3 SHEETS—SHEET 1.

Fig 1.



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Inventor
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Bartlett, Brownell & Mitchell

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3 SHEETS—SHEET 2.

Fig. 2.

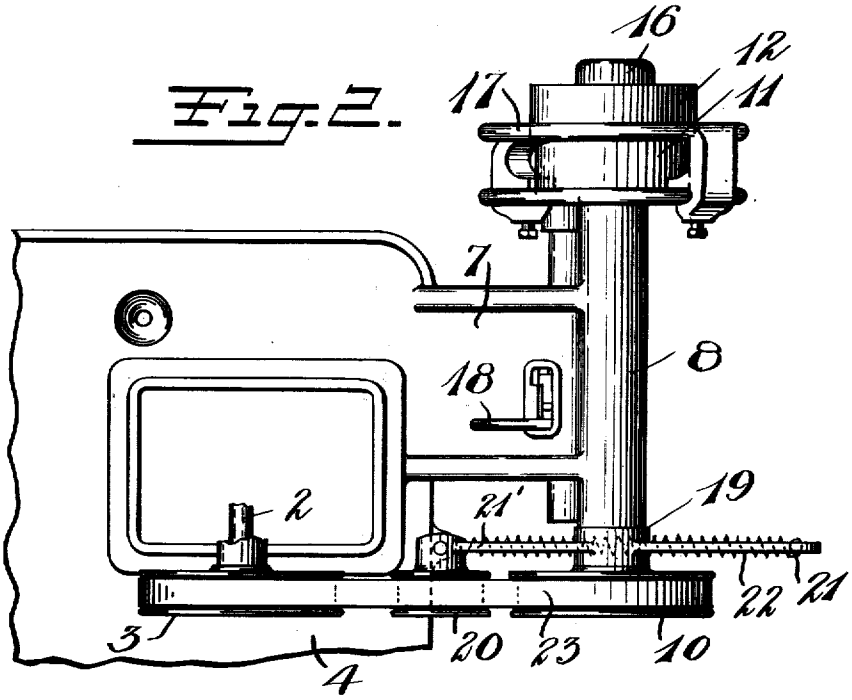
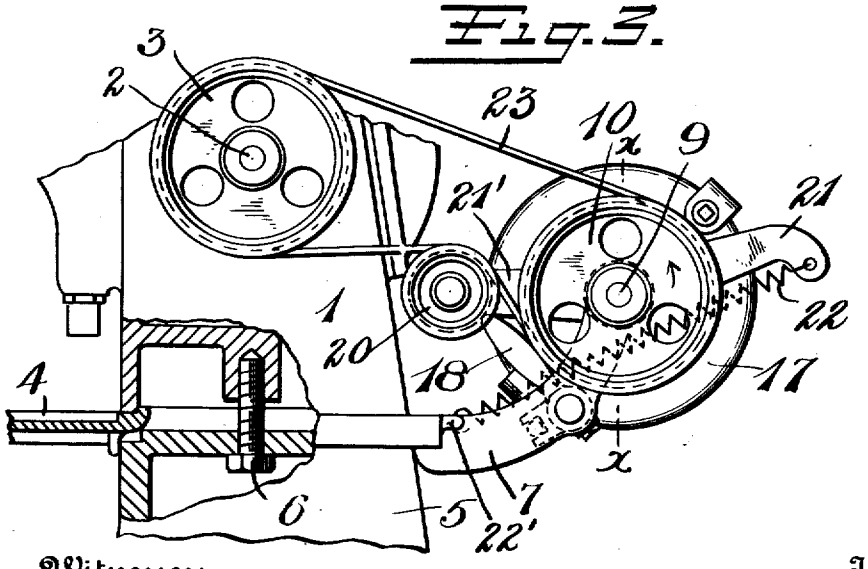


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

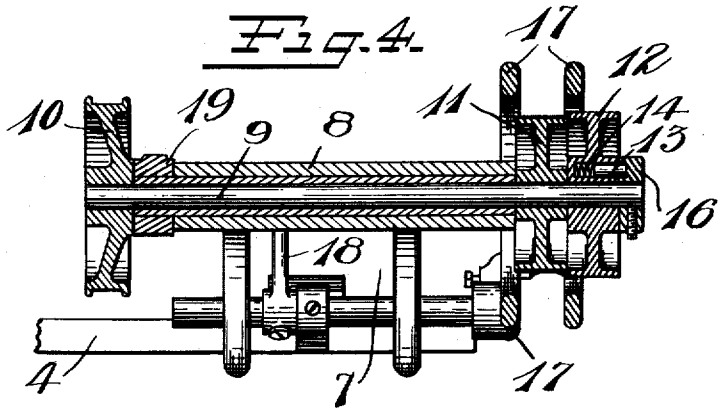


Fig. 5.

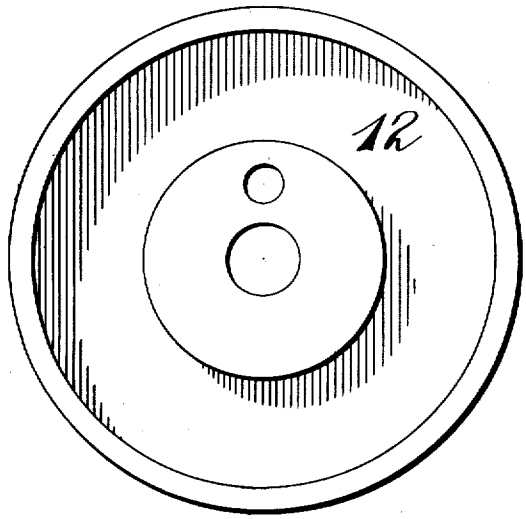
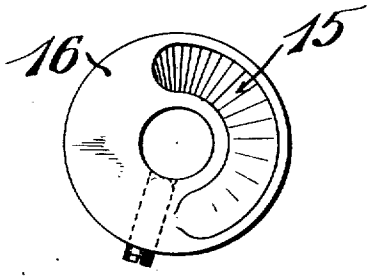


Fig. 6.



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UNITED STATES PATENT OFFICE.

SELDEN H. HALL, OF POUGHKEEPSIE, NEW YORK, ASSIGNOR TO THE DE LAVAL SEPARATOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

CENTRIFUGAL MACHINE.

1,156,285. Specification of Letters Patent. Patented Oct. 12, 1915.

Application filed March 2, 1914. Serial No. 822,020.

To all whom it may concern

Be it known that I, SELDEN H. HALL, a citizen of the United States, residing at Poughkeepsie, Dutchess county, New York, have invented certain new and useful Improvements in Centrifugal Machines, of which the following is a full, clear, and exact description.

My invention relates to improvements in centrifugal machines, such as cream separators, clarifiers or other machines having high inertia so as to make slow starting necessary, and has for its object to provide a machine having a self-contained device constituting the major portion of an automatic belt tension regulating machinery drive whereby such a drive can be easily applied to or removed from such a machine.

It further has for its object to provide an improved automatic belt tension regulating machinery drive in which the belt tension is maintained substantially uniform throughout a considerable range of variation in the length of the belt.

The following is a description of my invention, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a centrifugal cream separator embodying my invention. Fig. 2 is an enlarged plan view of the self-contained portion of the machinery drive shown in connection with the driven pulley and its shaft. Fig. 3 is an enlarged side elevation of the same shown in conjunction with portions of the supporting stool and base of the centrifugal machine, partially broken away. Fig. 4 is a section on the line x—x, Fig. 3. Figs. 5 and 6 are enlarged details of the ratchet pulley shown in Figs. 2 and 4.

Referring more particularly to the drawings, 1 is the base of a centrifugal cream separator of the well-known "De Laval" type which has high inertia so as to make slow starting desirable.

2 is the driven shaft of this machine carried by the base 1.

3 is a driven pulley mounted upon the shaft 2.

4 is a drip shelf clamped between the base 1 and the stool 5 by a tap screw 6 which holds these three parts together. Upon removing the tap screw 6, the base 1 can be lifted so that the drip shelf 4 can be removed. The drip shelf 4 is provided with a bracket 7 which carries a bearing 8 in which is journaled a shaft 9. Upon this shaft is mounted a driving pulley 10, a loose pulley 11 and a power pulley 12. In order that the shaft 2 may be driven in but one direction only, I make one of the pulleys 3, 10 and 12 a ratchet pulley capable of transmitting power when revolving in one direction only. For convenience, I make the pulley 12 the ratchet pulley, the ratchet being such that it can revolve the shaft 9 only in a counter-clockwise direction, as shown by the arrow in Fig. 3. The ratchet is of well-known construction, such as the pin 13 held out by a spring 14 so as to make engagement with the shoulder of an inclined recess 15 in the collar 16.

17 is a belt shifter also carried by the bracket 7 and provided with an upwardly extending handle 18 for shifting the power belt 17′ from the loose pulley 11 to the power pulley 12, and vice versa. Mounted concentric with the shaft adjacent to the driving pulley 10 is a lever 19 fulcrumed about the axis of the shaft 9. This lever is what is known as a lever of the first class and has upon its load arm 21′ a rotatable idler 20. Its power arm 21 is somewhat upwardly inclined relatively to the load arm and has connected to it a helical spring 22 whose axis in normal operation lies adjacent to the fulcrum of the lever, that is, in this instance, adjacent to the axis of the shaft 9, but does not coincide with said fulcrum; that is, the power of the spring 22 is exerted on a line slightly off the dead center of the power arm 21. The spring 22 is of such length and character as to have only a small increase of strength for the working range of extension. Its other end is secured to a lug 22′ carried directly by the drip shelf. The spring 22 acts to hold the idler 20 in yielding engagement with the drive belt 23 which loosely connects the pulleys 3 and 10. The side of the drive belt with which the pulley 3 engages is the working side, or, as I term it, the tight side of the belt, being the side through which the power is transmitted by the rotation of the pulley 10 in a counter-clockwise direction. The effective pull of the belt on the idler varies with the position of the idler 20. With the spring 22 connected as shown, when the effective pull of the belt decreases and the tension of the spring coincidently increases, the ef-

fective power arm decreases, and vice versa, the result being, when the spring 22 is of a proper constant, to maintain the belt tension substantially uniform throughout considerable changes in position.

The shaft 9 is driven by a suitable prime mover connected by a power belt passing around the pulley 12 in the form shown. If the power is applied from a shaft which is constantly rotating at a constant speed, such as a line shaft operating several separators, the transmitting belt being shifted from the loose pulley to the power pulley 12 in the ordinary manner, the shaft 9 immediately speeds up. The centrifugal machine, however, being a machine of high inertia, cannot be started so quickly. The result is that the tight working side of the belt 23 tightens, forcing the idler downwardly until the belt 23 becomes so loose as to slip. In this way the tension of the belt is maintained substantially constant during the period required to bring the centrifugal machine up to speed, which sometimes requires some three to five minutes in a centrifugal separator. When a quick starting electric motor, such as a constant speed electric motor, is used and such a motor is put into circuit without slowly cutting out resistance, the shaft 9 immediately comes up to speed while the centrifugal machine starts slowly on account of its high inertia, the idler 20 yielding so as to permit the belt 23 to loosen sufficiently to slip, thus maintaining the belt tension substantially constant during the period required for the centrifugal machine to come up to speed and preventing the motor from becoming overloaded.

In case a shock-producing gas engine, such as a gas engine having a light fly wheel is used to rotate the shaft 9, the action during the starting period of the centrifugal machine is substantially the same, and in addition, the shock due to the successive explosions and consequent sudden increases in speed during the normal operation of the gas engine, are prevented from being transmitted to the centrifugal apparatus. Upon every explosion of a gas engine having a light fly wheel, the speed of the shaft 9 suddenly increases, there being a decrease in speed before the next explosion takes place. Upon every such increase in speed of the shaft 9 due to such explosions, the working side of the belt 23 causes the idler 20 to yield so as to loosen the belt 23 and permit it to slip, with the result that even with a shock producing prime mover of this type, the belt tension of the belt 23 is maintained substantially uniform at all times.

The securing of uniform tension of the tight side of the belt 23, both during the starting period and at all times thereafter, has very material advantages. Thus, where the pulley 12 is started by being belted to a line shaft, the centrifugal machine is gradually brought up to speed without shock to it or its elements. Where the shaft 9 is driven by a constant speed electric motor, the same advantages are produced, and, furthermore, the motor need only be of such size as will properly run the centrifugal machine after it has gotten up to speed. It enables the starting inertia of the centrifugal machine to be sufficiently overcome by a motor of relatively small horse power. It prevents any motor which is sufficiently powerful to run the centrifugal machine after it has been brought up to speed from being overloaded during the starting period. When a shock-producing gas engine is used the automatic belt tension regulating device has the same advantage during the starting period and at all other times substantially prevents any shocks being transmitted to the centrifugal machine or its contents. Such constant shocks from a directly connected gas engine cause a centrifugal machine to rapidly deteriorate by injuring the parts of the same and, furthermore, by transmitting variations and jars to the contents of the separator, seriously impairs its product. By means of my improvement, therefore, the centrifugal machine can be safely driven under varying conditions without injuring the machine or its product. The larger portion of the regulating apparatus is self-contained being carried by the drip shelf so as to be easily applied to and removed from a centrifugal machine.

The ordinary De Laval centrifugal separator when operated by hand, is operated by a crank upon the shaft 24, but is provided with a projecting shaft 2. When converting a hand-operated machine to a power operated machine, all that is necessary is to remove the handle from the shaft 24, apply the pulley 3 to the shaft 2 and substitute the self-contained attachment consisting of the drip shelf 4 and parts carried thereby, for the ordinary drip shelf used on a hand-operated machine, applying the belt 23 to the pulleys 3 and 10. After these changes have been made, the centrifugal machine can be safely operated from either of the various sources of power above referred to.

This invention is an improvement upon the invention described in my application Serial No. 737,982, filed December 21, 1912, which claims subject-matter disclosed, but not claimed herein.

While I prefer to use a lever of the first class and a tension spring coacting therewith, my invention is not confined to the use of these specific forms, but, as will be evident to those skilled in the art, permits of various modifications in these and other

particulars without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. A self-contained attachment for a centrifugal machine consisting of a driving shaft, a lever, an idler carried by said lever, a spring for actuating said lever and a drip shelf removable from said machine, all of said elements other than said drip shelf being supported by said drip shelf independently of the base of said machine and removable simultaneously with said shelf from the machine.

2. A self-contained attachment for a centrifugal machine consisting of a driving shaft, a lever, an idler carried by said lever, a drip shelf removable from said machine, all of said elements other than said drip shelf being supported by said drip shelf independently of the base of said machine and removable simultaneously with said shelf from the machine, and a spring for actuating said lever, in combination with a driven pulley, a shaft for the same forming part of the centrifugal machine, and a belt loosely connecting said pulleys, against the tight side of which belt said spring holds said idler in yielding engagement.

3. A self-contained attachment for a centrifugal machine consisting of a driving shaft, a lever, an idler carried by said lever, a drip shelf removable from said machine, a spring between the power arm of said lever and said drip shelf for actuating said lever, all of said elements other than said drip being supported by said drip shelf independently of the base of said machine and removable simultaneously with said shelf from the machine, in combination with a driven pulley, a shaft for the same forming part of the centrifugal machine, and a belt loosely connecting said pulleys, against the tight side of which belt said spring holds said idler in yielding engagement.

4. A self-contained attachment for a centrifugal machine consisting of a driving shaft, a lever of the first class, an idler carried by said lever, a drip shelf removable from said machine, all of said elements other than said drip shelf independently of the base of said machine being supported by said drip shelf and removable simultaneously with said shelf from the machine, and a spring connected to the power arm of said lever for actuating said lever, in combination with a driven pulley, a shaft for the same forming a part of the centrifugal machine, and a belt loosely connecting said pulleys, against the tight side of which belt said spring holds said idler in yielding engagement.

5. A self-contained attachment for a centrifugal machine consisting of a driving shaft, a lever of the first class, an idler carried by said lever, a drip shelf removable from said machine, a spring connected between the power arm of said lever and said drip shelf for actuating said lever, all of said elements other than said drip shelf independently of the base of said machine being supported by said drip shelf and removable simultaneously with said shelf from the machine, in combination with a driven pulley, a shaft for the same forming a part of the centrifugal machine, and a belt loosely connecting said pulleys, against the tight side of which belt said spring holds said idler in yielding engagement.

6. A self-contained attachment for a centrifugal machine consisting of a driving shaft, a lever of the first class, an idler carried by said lever, a drip shelf removable from said machine, all of said elements other than said drip shelf independently of the base of said machine being supported by said drip shelf and removable simultaneously with said shelf from the machine, and a spring connected to the power arm of said lever for actuating said lever, said spring being a helical spring whose axis is adjacent to but does not normally intersect the axis of the fulcrum of said lever, in combination with a driven pulley, a shaft for the same forming a part of the centrifugal machine, and a belt loosely connecting said pulleys, against the tight side of which belt said spring holds said idler in yielding engagement.

7. A self-contained attachment for a centrifugal machine consisting of a driving shaft, a lever of the first class fulcrumed about the axis of said shaft, an idler carried by said lever, a drip shelf removable from said machine, all of said elements other than said drip shelf being supported by said drip shelf independently of the base of said machine and removable simultaneously with said shelf from the machine, and a spring connected to the power arm of said lever for actuating said lever, said spring being a helical spring whose axis is adjacent to but does not normally intersect with the axis of said driving shaft, in combination with a driven pulley, a shaft for the same forming a part of the centrifugal machine, and a belt loosely connecting said pulleys, against the tight side of which belt said spring holds said idler in yielding engagement.

8. A self-contained attachment for a centrifugal machine consisting of a driving shaft, a lever, an idler carrier by said lever, a drip shelf removable from said machine, all of said elements other than said drip shelf independently of the base of said machine being supported by said drip shelf and removable simultaneously with said shelf from the machine, and a spring for actuating said lever, in combination with a

driven pulley, a driven pulley shaft for the same forming part of the centrifugal machine, a belt loosely connecting said pulleys, against the tight side of which belt said spring holds said idler in yielding engagement, and means for driving said driving shaft, one of said pulleys between said means and the driven pulley shaft being a ratchet pulley capable of transmitting power when driven in one direction only.

9. In a centrifugal machine, the combination of a driving shaft, a driven shaft, pulleys thereon, a belt loosely connecting said pulleys, a lever, an idler carried by said lever, a helical spring connected to said lever and holding said idler in yielding engagement against the tight side of said belt, said lever being of the first class and said spring being connected to the power arm thereof and said idler being carried by the load arm thereof, the axis of said spring being adjacent to but not normally intersecting the fulcrum of said lever.

SELDEN H. HALL.

Witnesses:
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CHARLES L. POWELL.

Correction in Letters Patent No. 1,156,285.

It is hereby certified that in Letters Patent No. 1,156,285, granted October 12, 1915, upon the application of Selden H. Hall, of Poughkeepsie, New York, for an improvement in "Centrifugal Machines," an error appears in the printed specification requiring correction as follows: Page 3, line 37, claim 3, before the word "being" insert the word *shelf;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of November, A. D., 1915.

[SEAL.]

R. F. WHITEHEAD,

cting Commissioner of Patents.