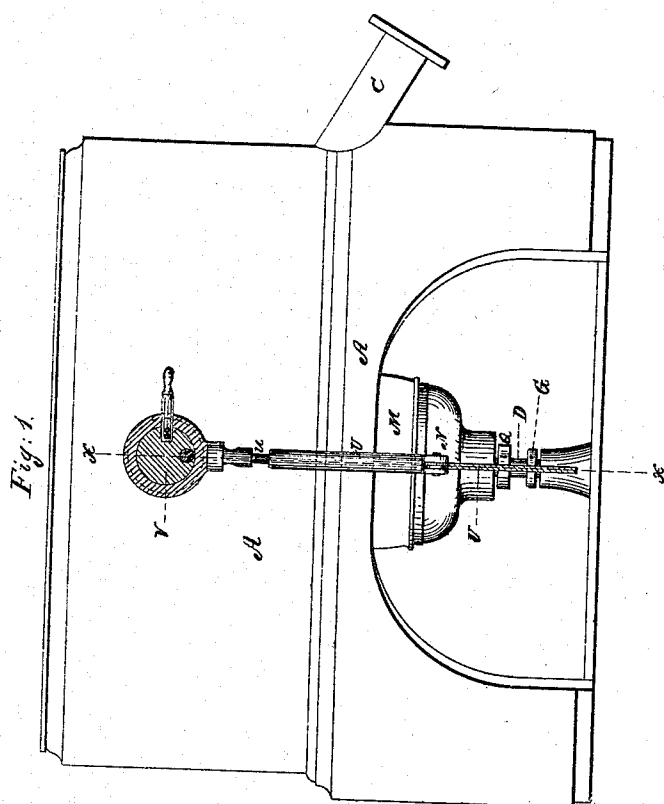


H. W. & R. LAFFERTY,
Centrifugal Sugar-Machine.

No. 106,491.

Patented Aug. 16, 1870.



Witnesses { *J. C. Young*
Geo. H. H. H. H.

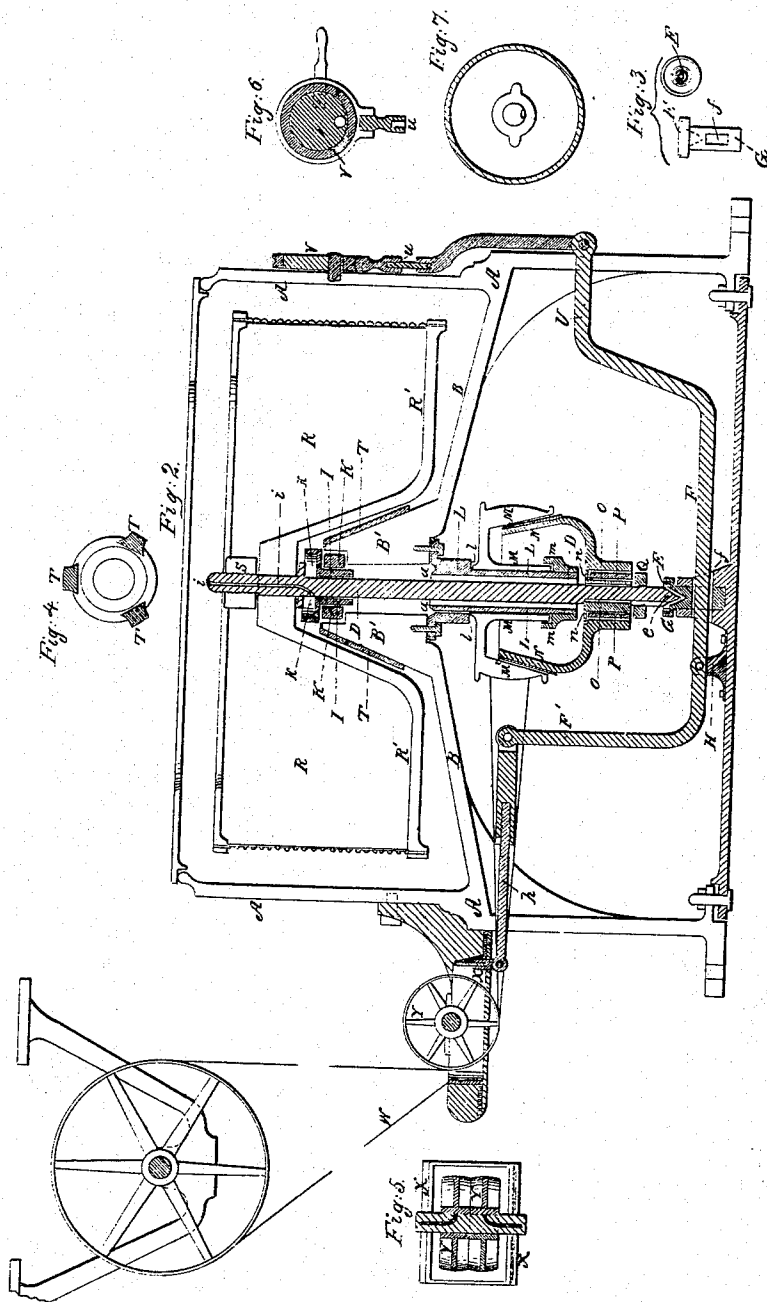
Hugh W. Lafferty - } Inventors.
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

HUGH W. LAFFERTY AND ROBERT LAFFERTY, OF GLOUCESTER, N. J.

IMPROVED CENTRIFUGAL SUGAR-DRAINING MACHINE.

Specification forming part of Letters Patent No. **106,491**, dated August 16, 1870; antedated August 5, 1870.

We, HUGH W. LAFFERTY and ROBERT LAFFERTY, of the city of Gloucester, in the county of Camden and State of New Jersey, have invented certain Improvements in the Construction of Machines for Draining Moisture from Sugar and other articles.

Our invention relates to the suspension of the vertical spindle carrying the drum or basket of a centrifugal machine upon a lever or other movable support, which may be combined with the casing thereof, whereby we produce, at pleasure, a movement of the spindle in the line of its axis; and in the combination, with said spindle, first, of a suitable friction-surface, to bear against a counterpart fixed surface in the casing of the machine, to serve as a brake; and, second, of a friction-clutch to engage a friction-pulley connected with the motive power of the machine, said brakes and pulleys being so arranged as that by vertical movement of the spindle the brakes may be removed or applied and the friction-pulley driving the spindle be simultaneously connected or disconnected.

It relates, also, to the combination of a sliding frame carrying idle-pulleys for tightening the driving-belt with the lever operating the spindle, in such manner that the movement to disengage the driving-pulley from the spindle will simultaneously relieve the belt from extreme tension; also, to the interposition of a connecting-sleeve, and of an elastic packing between the spindle and the friction-clutch, to permit a vibration or play of the spindle independently of the friction-pulley; and, also, in certain minor devices for facilitating the operations of these prominent features of our invention, as hereinafter fully set forth.

The object attained by these improvements is the production of a compact complete centrifugal draining-machine, so constructed as that, when finished, ready for transportation, it is ready for immediate use upon being secured in position, without requiring any fitting up other than the mere connection of a driving-belt to the pulley, and which shall also be free from jar or vibration, quick in its action, and under the ready control of a single operator.

Figure 1 of the accompanying drawing is

an elevation of our improved machine, with the eccentric controlling the machine illustrated in section. Fig. 2 is a central vertical section in the line *xx* of Fig. 1, illustrating all the parts of our machine. Figs. 3, 4, 5, 6, and 7 are detached views, partly in section, of various parts of our machine.

We use in our improved machines an outer casing, A, differing in no essential particular from the casings of the ordinary machines now in use, although we do not require brick foundations for its security, but are enabled, from the improved construction of the machine, to place it and operate it upon an ordinary solid flooring.

B, Fig. 2, is the bottom of the casing, provided, as usual, with an elevated central open cone, B', through which the spindle carrying the drum or basket projects from below, and made to slope or incline radially from the central cone, B', to the outer sides of the casing, as shown in Fig. 2.

C, Fig. 1, is a suitable spout, through which the liquids ejected from the drum are discharged from the casing.

D, Fig. 2, is the vertical spindle carrying the drum or basket of the machine. This spindle is supported at its lower end by a center-point, *e*, which rests and revolves in or upon a steel step, E, Figs. 2 and 3, resting in a block, G, placed upon or supported by a lever, F, pivoted to a fulcrum-block, H, secured upon a stout cross-bar, which is attached to the feet of the casing A, so as to rest upon the floor between them, as illustrated in Fig. 2.

The lever F is made to pass through a slot, *f*, Fig. 3, in the step-block G, so that said block has sufficient play on the lever to adjust itself to the vertical bearing of the spindle in any position of the lever.

The spindle D, extending vertically from its pivot-point at E, passes up through the enlarged aperture in the cone-center B' of the bottom B of the casing A, and is steadied by means of a metallic journal-box or bushing, I, placed near or at the upper extremity of said cone-center, and incased or encircled by a thick washer or packing, K, of india-rubber, or other elastic material, wide enough to extend into an annular recess or seat formed

therefor within said cone B', as fully illustrated in Fig. 2 of the drawing. This journal-box or bushing I is supported by means of a flange, *k*, extending out horizontally from its upper rim, over and beyond the elastic washer K, so as to rest upon the upper end of the cone B', and this flange is bent up, as shown in Fig. 2, to form a cup to receive and retain the oil required to lubricate the bearing of the spindle in said box I.

An aperture or groove, *i*, is formed to extend down from the upper end of the spindle to the cup *k*, for the purpose of feeding the same with oil.

By means of the elastic packing K' of the upper bearing of the spindle the lateral or vibratory motion produced by the rapid revolution of the drum when loaded is counteracted and dissipated, so that it is not communicated to the outer casing, A; and while said packing operates to retain the spindle and drum in a true vertical position, it permits also such an eccentricity of movement therein as to prevent all jarring of the casing in starting the machine.

L, Fig. 2, is a short hollow shaft encircling the spindle C beneath the casing A. This hollow shaft is provided with a flange about its upper end, by means whereof it is firmly bolted and secured to the bottom of the casing in such manner as to form a continuation of the opening in the cone-center thereof. Its diameter, however, is so much less than that of said opening as that it forms an annular offset, *a*, about the lower end of said opening, and this offset is grooved, so as to form a channel to collect the oil, which, passing down the spindle from its bearing in the box I, is thrown off therefrom by centrifugal force against the sides of of said opening.

M is the hub, and M' the rim, of a cone friction-pulley fitted to revolve freely upon the fixed hollow shaft L. This pulley bears up against a shoulder, *l*, formed about the shaft, near its upper end, as shown in the drawing, and is upheld against it, so as to have no longitudinal play on the shaft, by means of a cup-shaped nut, *m*, screwing onto the lower end of the shaft and embracing the lower end of the hub M.

Apertures are pierced to extend from the groove in the annular offset *a* to the shoulder *l*, so that the oil collected in said groove shall be conducted to the outer surface of the shaft, to lubricate the bearing of the pulley M thereon.

The projecting rim M' of the pulley is formed exteriorly to receive the belt communicating motion from a main driving-shaft, and is fitted interiorly with a conical seat, to receive a counterpart conical clutch, N, secured to the spindle C below the hollow shaft L, and projecting upward to inclose the same and pass within the pulley M, as illustrated in Fig. 2 of the drawing. This clutch N of the friction-pulley is not secured directly to the spindle.

A metallic sleeve, O, provided with an annular flange, *n*, about its upper rim, is first

slipped onto the spindle, and secured, so as not to turn thereon, by means of a feather or pin projecting from its inner surface into a straight longitudinal groove cut in the spindle. This sleeve is encircled below its flange *n* by a thick elastic washer, P, of a thickness not quite equal to the width of the flange, and the hub of the clutch N is slipped upon this washer against the projecting rim of the flange *n*, and the whole secured and upheld in place by an annular nut, Q, screwing upon a thread cut upon the spindle C, as shown in Fig. 2. The clutch is prevented from turning upon the washer P or its sleeve O by means of tongues projecting from the flange *n* of the sleeve O fitting into counterpart recesses in the upper face of its hub, as illustrated in Fig. 7.

By means of the interposed elastic washer P, any jar or tremulous motion of the clutch is dissipated without affecting the spindle, while the clutch and pulley are also protected from the effects of any sudden lateral motion of the spindle, leaving it free to move eccentrically, independent thereof, while receiving motion therefrom.

The clutch N is brought into close contact with the friction-pulley M, so as to engage the same and be carried thereby, by an upward movement of the spindle, and is disengaged by lowering the same.

It will be observed that, by removing the annular nut Q, the spindle may be lifted out entirely clear from the machine, and that the conical clutch N of the pulley M may be thus released and withdrawn when required.

R is the drum or basket of our machine, of the corrugated form patented by us March 23, 1869. The bottom R' thereof is made, as usual, with an upwardly-projecting conical center, through which the spindle passes, and which, resting upon a shoulder, *s*, formed on the spindle, just above its upper bearing I, is firmly secured and united thereto by means of a nut, S, screwing down thereon upon the upper end of the spindle.

The under-side of the bottom R' of the casing is so formed as to be the counterpart of the upper surface of the bottom B B' of the casing beneath, so that the two, when brought together, shall closely approximate and fit one upon the other, as illustrated in Fig. 2.

The approximation of these two surfaces serves to produce the friction required to retard and stop the revolution of the spindle and drum of our machine, this approximation being obtained by lowering the spindle and its attached drum so far as may be required.

To perfect the brake, we insert one or more strips or blocks, T T, Figs. 2 and 4, of hard wood or other suitable material, into dovetailed grooves, formed either in the upper face of the center cone, B', of the bottom of the casing, (see Figs. 2 and 4,) or in the under side of the counterpart conical central recess in the bottom R' of the drum, so that, when the drum is lowered by dropping the spindle, its weight, together with that of its contents,

bearing upon these strips, will produce such friction as shall speedily retard and arrest its revolutions.

Although we prefer to make the bottom of the drum or basket serve as a brake, it is evident that any other surface secured to the spindle so as to revolve with it, which may be brought by a vertical movement of the spindle into contact with a counterpart fixed surface, will subserve the same end.

As the brake and the friction-clutch are both fixed to the spindle, it is evident that the lowering of the spindle to disengage the clutch from the driving-pulley will simultaneously bring the brake into operation, and, contrariwise, the release of the brake will be simultaneous with the connection of the spindle to its motive power.

To place the movements of the spindle and drum under ready control and facilitate the starting and stopping of the machines, the lever *F*, upon which the spindle *D* is stepped and pivoted, is connected, by means of a bent arm, *U*, and an adjustable extensible link, *u*, with a cam or eccentric wheel, *V*, Fig. 6, secured to the side of the casing, within easy reach of the operator.

The adjustment of the lever and link with this eccentric is so made as that, when the eccentric *V* is turned to its point of greatest eccentricity, the spindle *C* is elevated to its highest point and the friction-clutch *N* brought into closest contact with its pulley *M*, and by reversing it the spindle will be lowered, the clutch disengaged, and the brakes brought into operation. As, by raising the spindle to its highest point and forcing the clutch into closest contact with the driving-pulley *M*, the pulley is forced upon its shaft with undue pressure against the offset or shoulder *l*, which limits its play upon said shaft, we contemplate so placing the stop limiting the revolution of the eccentric *V* as that, after it shall have reached its extreme or dead point and forced up the spindle to the utmost, it may pass beyond it slightly, and thus allow the spindle to drop back sufficiently to relieve the driving-pulley from pressure without disengaging its clutch.

The pulley *M* of the spindle *D* of our machine is driven by a single belt, *W*, from the main line of shafting, instead of by a countershaft and two belts, as in other styles of centrifugal machines. This belt is alternately tightened or loosened, as the machine is started or stopped, by means of idle-pulleys *Y Y*, Figs. 5 and 2, placed in a frame, *X*, made to slide horizontally in ways on arms or brackets secured to the casing of the machine at a point immediately opposite to the eccentric operating the lever. This frame *X* is connected by a horizontal adjustable extensible rod or link, *h*, to an upwardly-bent arm, *F'*, of the lever, on the side of its fulcrum *H* remote from that on which the spindle rests, as fully illustrated in Fig. 2 of the drawing, so that the movement of the lever to lower the spindle in stop-

ping the machine will draw the frame *X* inward toward the driving-pulley, and thus loosen the belt passing over the idle-pulleys *Y Y*, and vice versa.

The operation of our machine is easily understood by reference to the drawing, Fig. 2. All that is required to start it is to move the arm or handle attached to the eccentric *V*. This motion raises the lever *U F*, and thereby simultaneously raises the spindle *D*, forces the friction-clutch *N* into contact with the friction-pulley *M*, forces out the sliding frame *X* carrying the idle-pulleys *Y Y*, thereby tightening the driving-belt *W*, and lifts the drum *R R'* from its contact with the cone-center *B'* of the casing *A*, relieving the brake formed thereby.

The movement of the eccentric *V* to accomplish these results is produced with great ease, requiring very little expenditure of physical force, and the entire machine is thus readily and easily controlled by reversing or turning the handle of the eccentric in one direction or the other.

In this machine the driving-belt cannot pull the spindle to one side, causing an unequal wear of its bearings, as in the old styles of centrifugal machines, for there is no strain whatever from the belt upon said spindle, the strain being exerted and resisted wholly by the independent fixed hollow shaft *L*, on which the driving-pulley runs.

It is to be understood that while the machine is stopped the driving-belt does not drag over the surface of the pulley *M*, but that there is always sufficient tension thereon to keep the pulley running, so that, although the belt is relieved from strain, it is not damaged by friction thereon.

The proper degree of tension upon the belt may be at all times quickly adjusted without having to take up its length by lengthening or shortening the screw, adjusting-rod, or link *h*. So, also, the adjusting-screw *u* in the link of the opposite arm *U* of the lever enables the operator to adjust the contact of the friction-surface of the brake as may be found desirable by controlling the extent to which the spindle *D* shall be elevated or depressed.

As the eccentric controlling the movements of the spindle and the brackets carrying the idle-pulleys over which the driving-belt passes are secured to the casing of the machine, and the spindle itself receives its support wholly from said casing, the entire machine is not only compact and portable, but complete in itself.

The facility with which the drum and spindle can be detached and removed and all other parts reached for repair is an important point in considering the advantages of our machine.

We claim as our invention—

1. Suspending the vertical spindle carrying the drum or basket of a centrifugal draining-machine upon a movable support, to obtain a movement of the spindle in the line of its axis, substantially as herein set forth.

2. The combination, in a centrifugal machine,

of a friction-surface upon its basket or drum with a counterpart friction-surface upon its casing, when said basket or drum is free to move in the line of its axis as well as to revolve thereon, substantially as herein set forth.

3. A friction-clutch, N, secured to the movable spindle D, carrying the drum or basket B of a centrifugal machine, in combination with a friction-pulley, M, revolving upon a fixed hollow shaft encircling said spindle, but wholly disconnected therefrom, substantially in the manner and for the purpose herein set forth.

4. The combination of the annular cup-shaped nut with the lower end of the fixed hollow shaft L, and of the friction-pulley M, substantially in the manner and for the purpose herein set forth.

5. The combination of the friction-clutch N of the pulley M with the spindle D, by means of an interposed sleeve, in such manner as that, while neither can revolve independently of the other, either may vibrate or have slight lateral motion without communicating the same to the other, substantially as herein set forth.

6. An elastic washer or packing interposed

between the spindle D and friction-clutch N of a centrifugal machine, substantially in the manner and for the purpose herein set forth.

7. A lever, F, in combination with the spindle D of a centrifugal machine, substantially as herein set forth.

8. The combination of an eccentric, V, with the lever F, carrying the spindle D of a centrifugal machine, substantially as herein set forth.

9. The combination of a movable frame, X, carrying the idle-pulleys Y Y, with the lever F F', supporting the spindle D of a centrifugal machine, substantially as herein set forth.

10. Extensible links interposed between the arms of the lever F and its eccentric on one side and the sliding frame X on the other, substantially as herein described.

In testimony whereof we have hereunto set our hands.

HUGH W. LAFFERTY.
ROBERT LAFFERTY.

Witnesses:

PETER M. ADAMS,
JOSEPH McADAMS.