(No Model.) 2 Sheets—Sheet 1.

H. W. LAFFERTY.

CENTRIFUGAL MACHINE.

No. 422,083. Patented Feb. 25, 1890

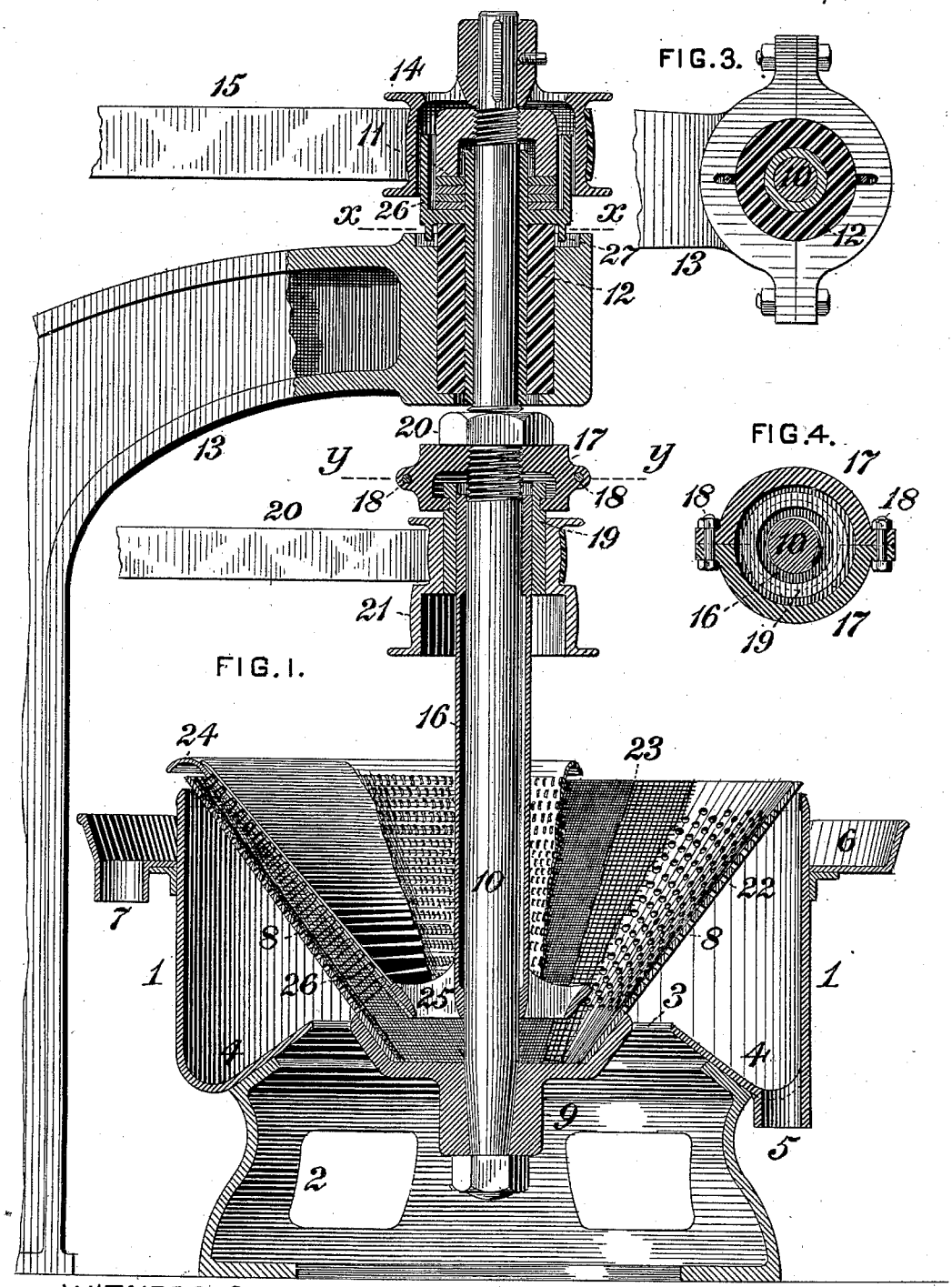


FIG. 1.

FIG. 3.

FIG. 4.

WITNESSES:

E. Newell.

F. E. Gaither.

INVENTOR:

Hugh W. Lafferty

by J. Lowndes Bell.

atty

(No Model.) 2 Sheets—Sheet 2.

H. W. LAFFERTY.

CENTRIFUGAL MACHINE.

No. 422,083. Patented Feb. 25, 1890.

FIG. 2.

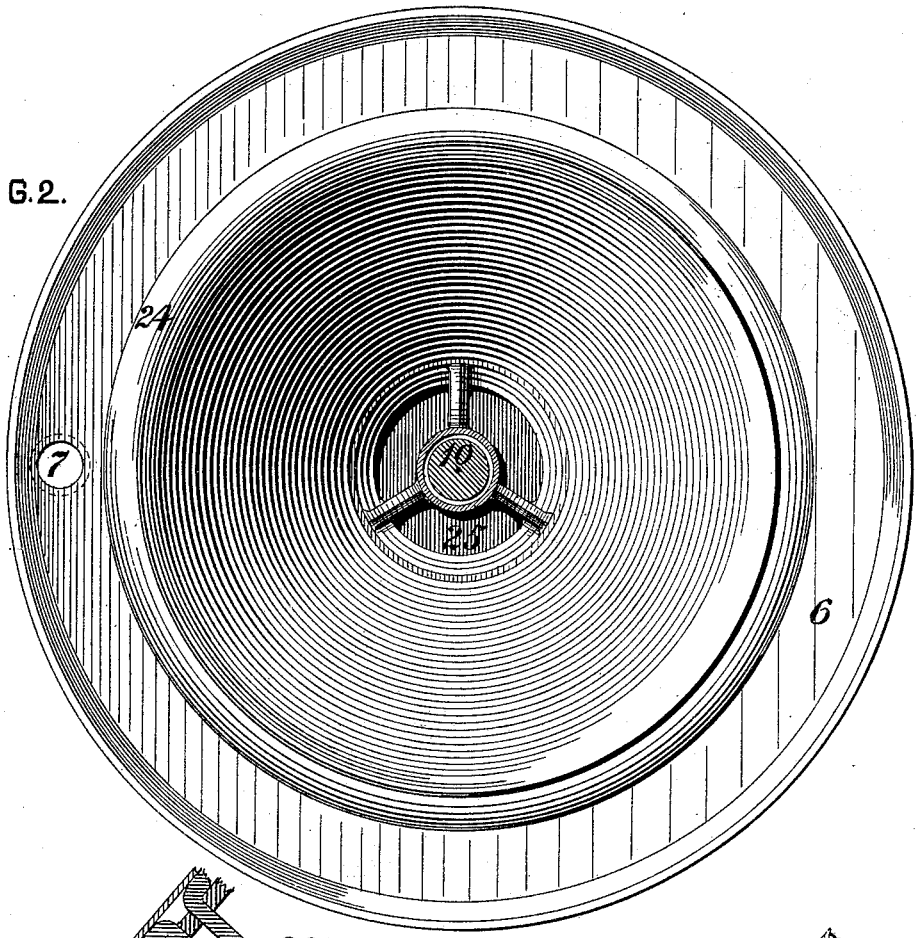


FIG. 6

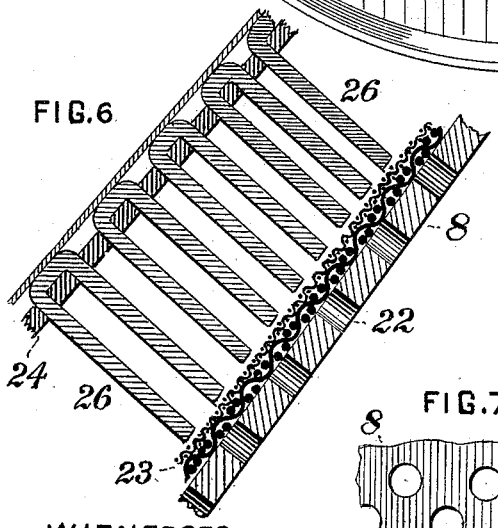


FIG. 5.

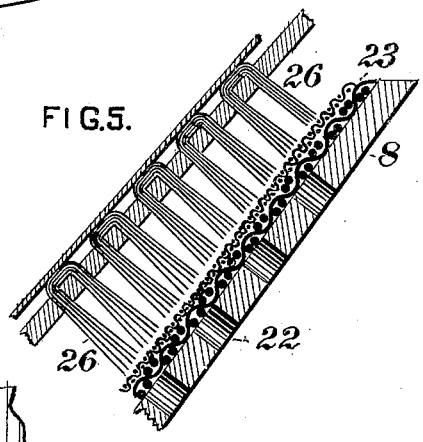
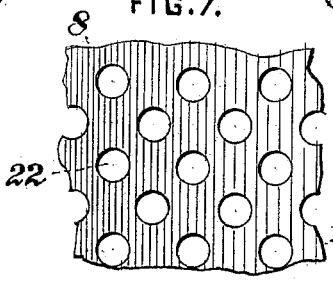


FIG. 7.



WITNESSES:

E. Newell.

F. E. Gaither.

INVENTOR:

Hugh W. Lafferty.

by J. Snowden Bell.

Atty.

UNITED STATES PATENT OFFICE.

HUGH W. LAFFERTY, OF WILMINGTON, DELAWARE.

CENTRIFUGAL MACHINE.

SPECIFICATION forming part of Letters Patent No. 422,083, dated February 25, 1890.

Application filed August 12, 1889. Serial No. 320,467. (No model.)

To all whom it may concern:

Be it known that I, HUGH W. LAFFERTY, of Wilmington, in the county of New Castle and State of Delaware, have invented a certain new and useful Improvement in Centrifugal Machines, of which improvement the following is a specification.

My invention relates to machines for the separation of mingled solid and liquid matters by centrifugal force, of the class or type in which the charge to be treated is passed between an inner imperforate receiving-vessel and an outer perforated drum or basket, the liquid constituents of the charge being drained off through the perforations of the latter and the solid constituents discharged over its top.

The object of my invention is to facilitate and perfect the operation of machines of the above character by the provision of simple and effective means for so regulating the upward and outward traverse of the solid portions as to prevent the formation of lumps or cakes therein and insure the thorough extraction of the liquid portions therefrom. The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a vertical central section through a centrifugal machine embodying my invention; Fig. 2, a plan or top view of the same with the spindle and sleeve in section; Figs. 3 and 4, horizontal sections at the lines *x x* and *y y*, respectively, of Fig. 1; Figs. 5 and 6, transverse sections, on an enlarged scale, through portions of the receiving-vessel and basket, illustrating different forms of regulating-projections, and Fig. 7 a view in elevation of a portion of the shell or body of the basket.

In the practice of my invention I provide a stationary outer casing 1, which is preferably, as shown, of cylindrical form, and is supported upon a suitable base 2, which rests upon a floor or other foundation. The bottom of the casing 1 is turned upwardly toward a circular opening 3 at its center, forming an annular circumferential channel 4, which is provided with a discharge-spout 5. A trough or channel 6, having a discharge-spout 7, surrounds the casing 1 below its top, and serves to receive the solid portions of the charge as delivered in the operation of the machine.

A perforated separating drum or basket 8, having the form of an inverted frustum of a cone, is secured at its bottom to a hub or boss 9, which is fixed upon the lower end of a spindle 10, which is supported and steadied near its upper end on annular bearings 11 12, fitted in a vertical frame or standard 13, which is fixed to the floor or foundation adjacent to the casing 1, the spindle being so located vertically relatively to the casing that the top of the basket 8 may project slightly above the top of the casing, the boss 9 and lower end of the spindle extending below the bottom of the casing through the opening 3 therein.

The spindle 10 carries near its upper end a driving-pulley 14, and is rotated by a belt 15 from a prime mover or countershaft passing around said pulley. The upper bearing-rings 11 of the spindle rest in cylindrical oil-box 26, formed on the lining of the cylindrical bearing 12, and held against rotation by pins 27, fitting in grooves in the top of the frame 13. The basket 8 is formed of an outer shell having a series of perforations 22 and a lining of coarse and fine wire-netting 23, being in this particular similar to those heretofore employed.

A sleeve or tubular shaft 16 incloses the spindle 10, fitting at its upper and lower ends freely around the spindle, and is supported by a nut 17, formed in two sections connected by bolts 18, and engaging a screw-thread cut upon the spindle. The sleeve 16 has fixed upon its upper end a sleeve 19, which is provided with an annular circumferential groove engaged by a corresponding bearing-flange on the supporting-nut 17. The sectional construction of the nut 17 admits of its ready connection and removal, and by its vertical adjustment on the screw-thread of the spindle 10 the sleeve 16 and connected receiving-vessel, to be presently described, may be raised and lowered as desired, the sleeve being held in adjusted position by a lock-nut 20, engaging the screw-thread of the spindle above the nut 17. Rotation is imparted to the sleeve 16,

independently of the spindle 10, by a driving-belt 20, passing around one of the faces of a cone-pulley 21, secured upon the sleeve 19.

An open-topped receiving-vessel 24, corresponding substantially in form with the separating-basket 8 and having openings 25 in its bottom, is formed or fixed upon the lower end of the sleeve 16, the top of the vessel 24 projecting outwardly slightly beyond that of the basket 8. The receiving-vessel into which the charge of material to be treated is supplied may be formed, as shown, of different inclination in transverse section from the basket 8, so as to gradually vary the transverse section of the space between its outer face and the basket, through which space the material passes upwardly and outwardly during the separating operation. In order to retard and properly regulate the traverse of the solid portions, and thereby to insure, as far as practicable, the thorough extraction of the liquid, as well as to effect and maintain a complete disintegration of the solid portions and prevent the formation of cakes or lumps therein, I provide the outer face of the receiving-vessel 24 with a series of teeth or isolated projections 26, which extend from said face throughout substantially the entire space between the same and the basket, nearly up to the lining 23 of the latter—that is to say, to within such distance therefrom as will be sufficient to prevent contact therewith in the rotation of the receiving-vessel and drum.

The projections 26 are preferably formed of metal wires or rods of small diameter, the same being adapted to be readily secured to the receiving-vessel 24, but it will be obvious that they might be made integral therewith, if desired. As illustrated in Fig. 5, they are formed of bundles or brushes of wire, the wires of each brush being passed through two adjacent holes in the receiving-vessel and extending outwardly therefrom, while in Fig. 6 single rods of larger diameter bent into U form are similarly passed through holes in the receiving-vessel. In either case the rods or wires may be quickly and conveniently fixed in position and replaced by new ones when broken or worn out. The projections 26 are shown in Fig. 1 as arranged in circular series around the periphery of the receiving-vessel; but I prefer to locate them thereon in helical rows, similarly to the arrangement of the perforations 22 of the separating-basket, as indicated on the right hand of the same figure, their dimensions and relative distance apart being varied in the discretion of the constructor, and depending to some extent upon the characteristics of the material upon which the machine is designed to operate.

It will be seen that by the provision of the projections 26 the discharging-space is divided into a series of communicating avenues or passages through which the material passes during the process of separation, and in addition to being retarded by the projections so as to prevent an unduly rapid discharge of the solid constituents and insufficient extraction of liquid, the solid constituents are maintained in a disintegrated condition, and the formation of lumps, which has heretofore been a material objection, is effectually obviated. The projections 26 also tend to prevent the clogging of the lining of the basket by the adherence of solid matter thereto and the irregular discharge and interference with proper balance, which is occasioned by the perforations of the basket becoming obstructed or gummed up on portions of its surface and remaining comparatively free on others.

In operation the charge of wet or semi-fluid material is fed into the receiving-vessel 24, and the spindle 10 and sleeve 16 are preferably rotated at different speeds, such independent movement of the receiving-vessel and basket acting, in connection with the projections 26, to further promote the retarding and regulating action of the projections. The disintegrated and dried solid constituents are delivered over the top of the basket 8 into the trough 6, and the liquid portion is discharged through the perforations of the basket into the lower channel 4, from which they are drawn off through the spout 5.

I do not limit myself to a construction in which the projections 26 are secured to the receiving-vessel, as they may be fixed on the basket 8, if preferred, without variation of function or departure from the spirit of my invention. The former construction is, however, for structural reasons, deemed by me to be most advantageous in practice.

I am aware that the combination of a conical outer perforated separating-vessel and a corresponding inner receiving-vessel provided with external helicoidal blades or flanges extending throughout the space between the two vessels was known in the art prior to my invention, and such, or any equivalent construction, I hereby distinctly disclaim. The essential and substantial difference between centrifugal machines of such description and my present invention lies in the fact that in the former the helicoidal blades form continuous and uninterrupted conduits through which the material under treatment passes from the point of reception to that of delivery, and is neither subjected to any disintegrating action nor as fully retarded as I have found in practice to be desirable in attaining the most perfect results. Under my invention no continuous or unbroken passage is afforded, but, on the contrary, the provision of a multiple series of isolated tooth-like projections breaks up or divides the space between the inner and outer vessels into numerous intercommunicating smaller spaces, the teeth acting upon the outgoing material analogously to those of a series of coarse combs, both in breaking up lumps and preventing such unduly-rapid movement as would

tend to induce imperfect or incomplete separation of the solid and liquid portions of the charge.

I claim as my invention and desire to secure by Letters Patent—

1. In a centrifugal machine, the combination of an outer casing, a conical separating drum or basket and a conical receiving-vessel, each adapted to rotate within the casing, and a series of retarding and regulating teeth or isolated projections interposed between the basket and receiving-vessel, substantially as set forth.

2. In a centrifugal machine, the combination of an outer casing, a conical separating drum or basket and a conical receiving-vessel, secured concentrically upon independent shafts and adapted to rotate within the casing, and a series of retarding and regulating teeth or isolated projections interposed between the basket and receiving-vessel, substantially as set forth.

3. In a centrifugal machine, the combination of an outer casing, a conical separating drum or basket and a conical receiving-vessel, each adapted to rotate within the casing, and a series of retarding and regulating teeth or isolated projections fixed upon the receiving-vessel and extending therefrom toward the adjacent face of the separating-basket, substantially as set forth.

4. In a centrifugal machine, the combination of an outer casing, a conical separating drum or basket and a conical receiving-vessel, each adapted to rotate within the casing, and a series of retarding and regulating projections formed of isolated wire brushes fixed upon the receiving-vessel and extending therefrom toward the adjacent face of the separating-basket, substantially as set forth.

HUGH W. LAFFERTY.

Witnesses:
ABNER J. DAVIS,
JAMES H. SHIELDS.