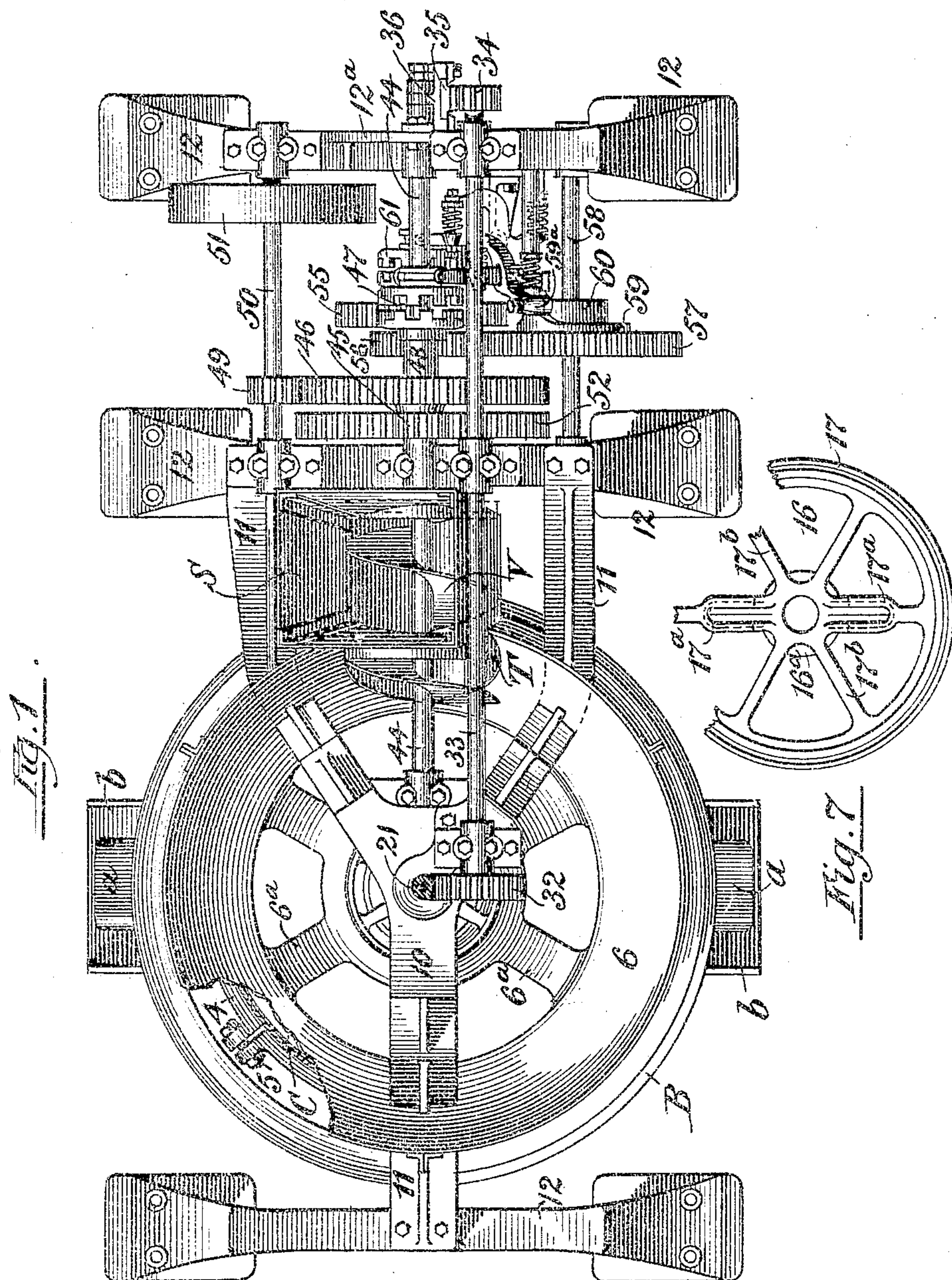


No. 778,458.

PATENTED DEC. 27, 1904.

J. C. MORRISON.
CENTRIFUGAL MACHINE.
APPLICATION FILED DEC. 7, 1903.

4 SHEETS—SHEET 1.



Witnesses:

Frank Blanchard
Mary Malloy

Inventor:

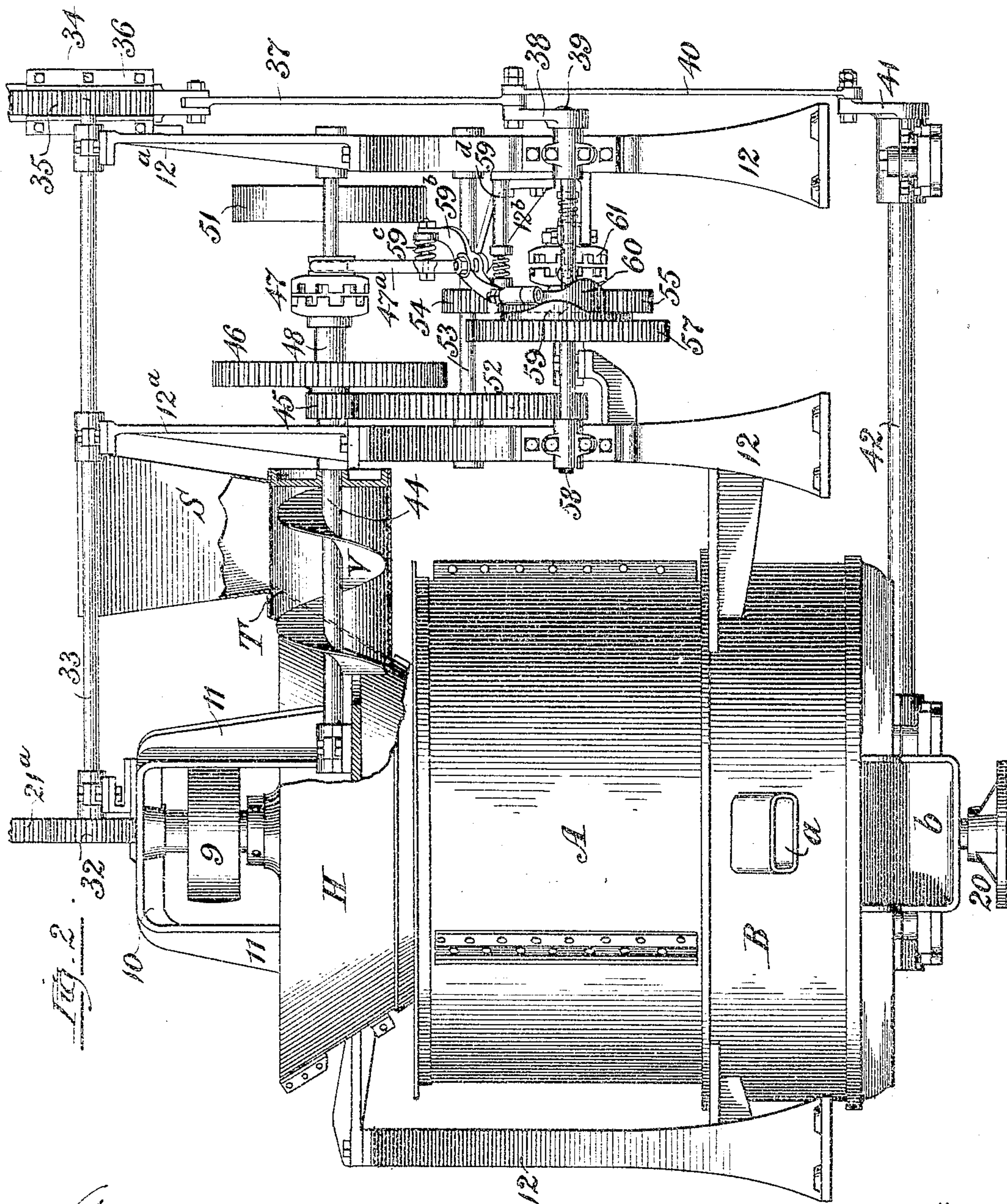
John Campbell Morrison,
per Robt. A. Kellond,
Attorney.

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4 SHEETS—SHEET 2.



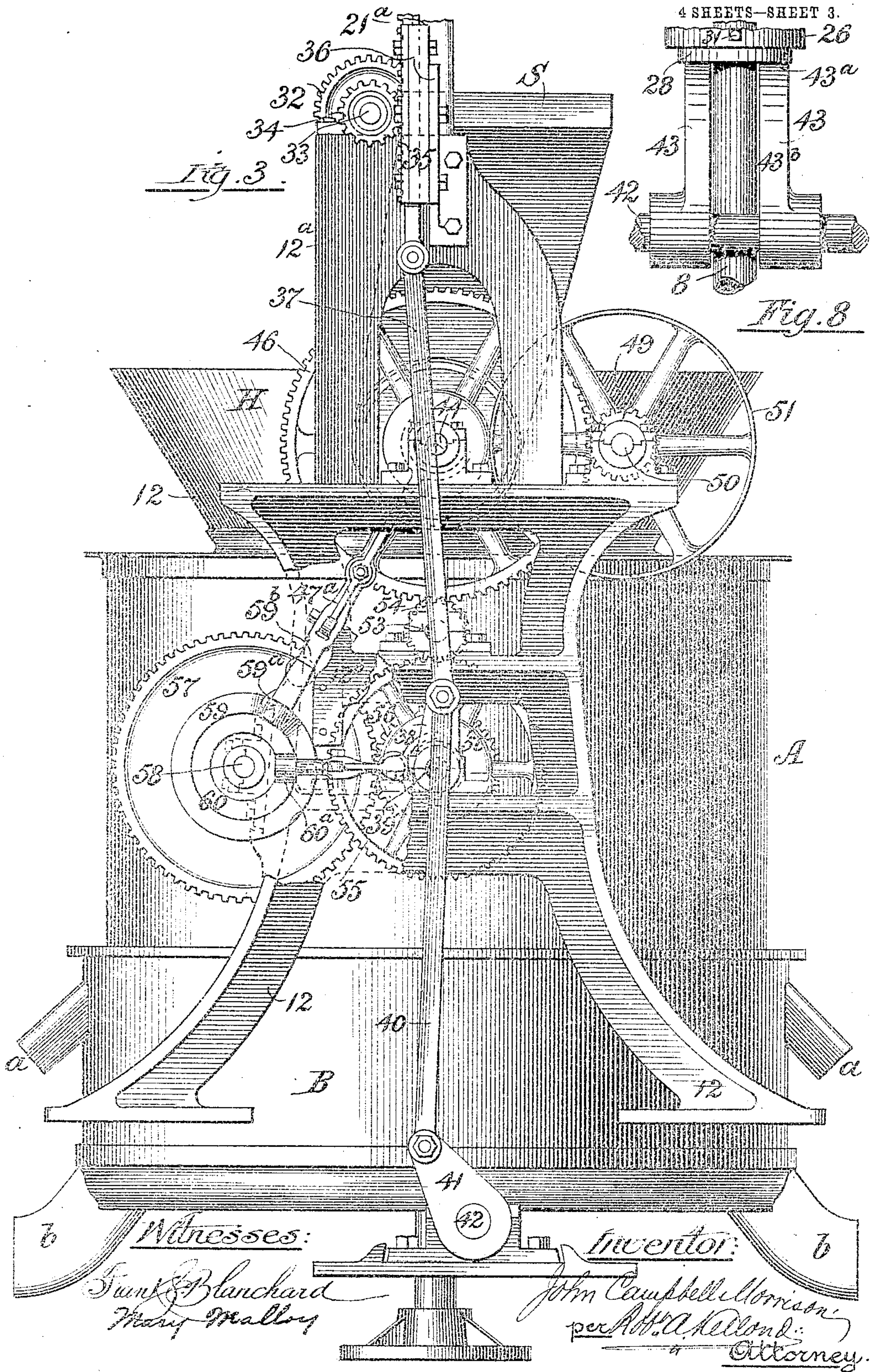
Witnesses:
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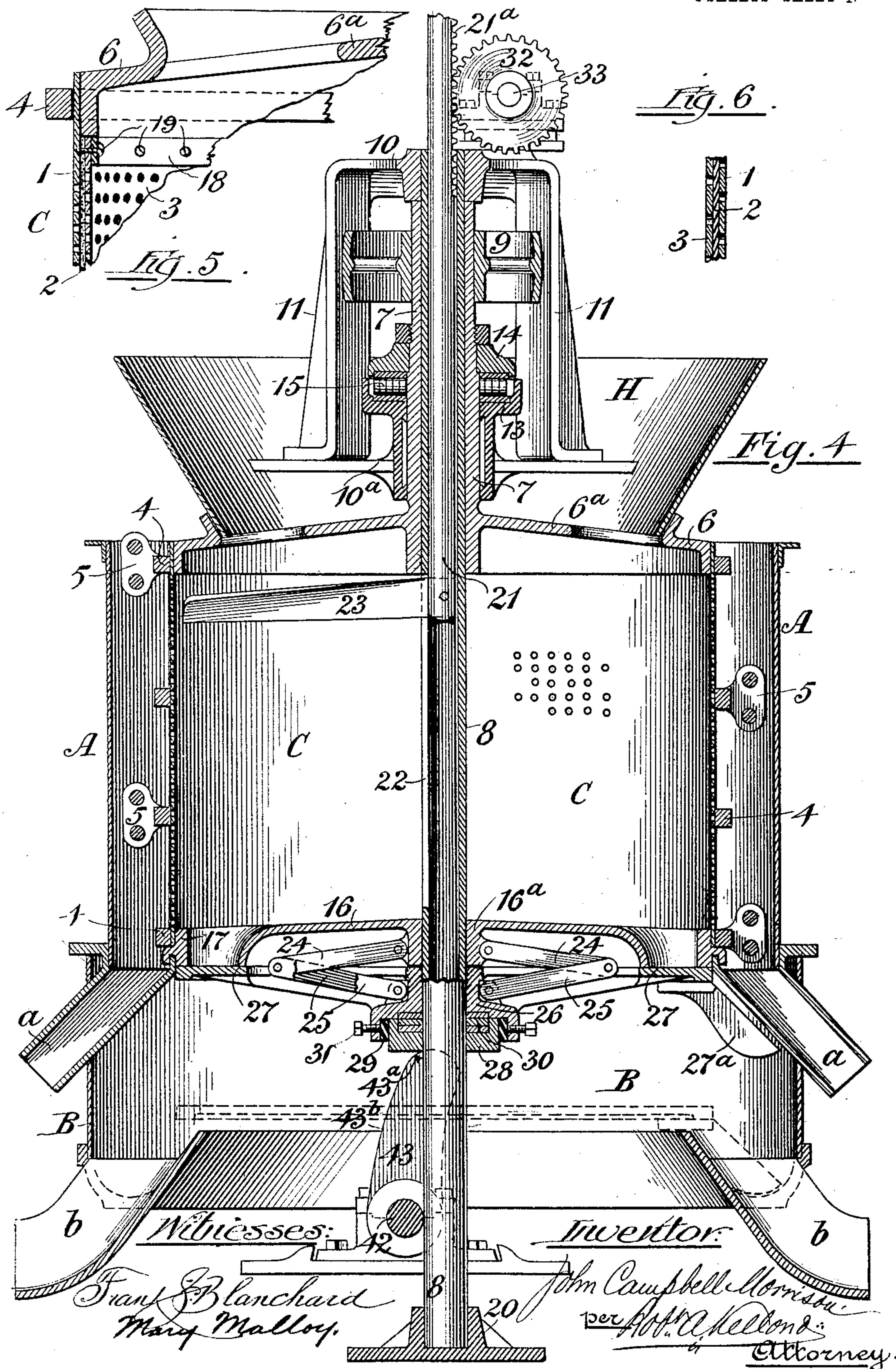


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4 SHEETS—SHEET 4.



UNITED STATES PATENT OFFICE.

JOHN CAMPBELL MORRISON, OF CHICAGO, ILLINOIS, ASSIGNOR TO
UNITED STATES PEAT FUEL COMPANY, A CORPORATION OF ILLI-
NOIS.

CENTRIFUGAL MACHINE.

SPECIFICATION forming part of Letters Patent No. 778,458, dated December 27, 1904.

Application filed December 7, 1903. Serial No. 184,002.

To all whom it may concern:

Be it known that I, JOHN CAMPBELL MORRISON, a citizen of the United States, residing at the city of Chicago, Cook county, and State of Illinois, have invented certain new and useful Improvements in Centrifugal Moisture-Expelling Machines, of which the following is a specification.

This invention relates to centrifugal machines, and has for its principal object to provide for rapid automatic ejection of the material operated upon after the excess of liquid has been removed therefrom.

Another object of my invention is to enable the material to be automatically fed intermittently or in continuous separate charges commensurate with the most efficient and rapid working of the moisture-expelling instrumentalities.

A third important object of the invention is to so associate and combine the feed and discharge of material that while the discharge of the moisture-relieved portion of each charge is taking place the feed of moisture-laden material automatically ceases, only to be renewed and a fresh charge supplied when the previous charge has been disposed of.

Other advantages and useful results are derived from a novel and economical construction and arrangement of parts, as will be apparent from the detailed description, it being premised that my invention is more particularly applicable to the removal of the surplus liquids or inherent moisture from such materials as crude peat, intended for the production of fuel briquets, horse-bedding, hoof-stuffing, and other manufactured or recovered products of this absorbent and fibrous material or such other materials as beet-pulp in the manufacture of sugar and like substances of a hygrometric and highly-absorbent character which require treatment for the removal of the preponderance of liquids to fit them for final and complete drying by the application of heat or for subjection to other processes.

To these ends my centrifugal moisture-expelling machine embodies a revoluble cylindrical basket of novel construction as regards

its walls and connections, an automatically-movable gate at the bottom of the basket, an automatic and regulable feed device, connections between the movable bottom gate and the feed whereby a joint intermittent action is secured, and devices for automatically cleaning the inner walls of the apparatus.

Other novel features of construction and combinations of parts are included in my invention, all of which will now be described in a preferred and highly-efficient form, and the novel features will then be set forth in the appended claims, reference being had to the accompanying drawings, illustrating such preferred form and forming part of this specification, in which similar reference characters indicate corresponding parts in the several figures.

In said drawings, Figure 1 is a plan view of the machine. Fig. 2 is a side elevation of the same with parts in section. Fig. 3 is an end elevation. Fig. 4 is a vertical sectional elevation. Fig. 5 is an enlarged sectional detail illustrating the construction of the basket. Fig. 6 is an enlarged sectional detail of the basket-wall. Fig. 7 is a plan of part of the spider carrying the bottom edge of the basket, drawn to a reduced scale. Fig. 8 is a detail, taken at right angles to Fig. 4, illustrating the double cam which is used for raising the gate controlling the discharge.

A represents the outer shell of the centrifugal, preferably cylindrical and formed of sheet-steel, said shell being mounted upon a suitable stationary base B, said shell having a water-channel and any desired number of spouts *a a* for draining off the water therefrom as it is eliminated from the material under treatment in the revoluble concentrically-arranged cylindrical basket C, said drainage-spouts extending from the bottom of the shell A out through the walls of the base B or arranged in any other suitable manner. The base B is formed hollow, preferably of cast-iron, and has two or more discharge-spouts *b b* for the material after it has been subjected to centrifugal action in the cylindrical basket, as will be hereinafter more fully explained.

The wall of the basket C is of course fo-

raminous, and I prefer to form it of an outer layer of sheet-steel 1, an intermediate layer 2 of filter-cloth, and an inner layer 3 of sheet-brass, the perforations in said outer and inner layers preferably out of alinement with each other, all as shown in the detail views, Figs. 5 and 6, the object of the filter-cloth 2 being to arrest and save the fine humus of peat or the fine pasty portion of other materials which would otherwise escape with the water. The wall of the basket thus formed is reinforced and bulging out prevented by a series of surrounding metal bands 4 4, the ends of which are provided with lugs 5 5, drawn together and bolted tightly.

The upper edge of the basket C is firmly connected, as will be hereinafter more particularly described, to an annular flange 6, connected by radial arms or webs 6^a with a central vertical sleeve 7, which is in turn slipped over a vertical hollow fixed standard 8, so as to be rotated thereupon through the medium of a driving-pulley 9, keyed to the sleeve 7 a short distance below its upper end, which latter closely approaches the under side of the central boss of a supporting yoke-frame 10, the legs 11 of which are extended through the walls of a hopper H and find their base upon standards 12 12, which in turn are bolted to the floor or to any suitable supporting-frame. In the lower part 10^a of the frame 10 there is a fixed bearing 13, the upper end of which is cup-shaped to form one member of a roller-bearing, the other member of same being formed by a collar 14, fixed upon the sleeve 7, each member having proper wearing-rings between which lie steel rollers 15. It is the bearing just described which supports the basket C and its accessories from the top, as will be clearly seen in Fig. 4.

16 represents a spider, to the outer annular rim 17 of which the lower edge of the basket C is fastened in a similar manner to that employed at the upper edge—viz., by bolts, rivets, or brazing—and, as shown only in Fig. 5, internal reinforcing-rings 18 may be employed within the flanges or rims 6 and 17, the same being held to the wall made up of plates 1 and 3 and filter-cloth 2 by screws 19, thus allowing of the ready assemblage of these parts and permitting the easy removal of any or all of these elements and the substitution of others of different texture to suit varying requirements in the treatment of specific materials.

The hollow fixed standard 8 is stepped in a suitable base-block 20 and extends centrally of the basket C and within the sleeve 7 to rigid connections with the head of the yoke-frame 10, as shown clearly in Figs. 2 and 4. That portion of this hollow standard 8 which is within the basket proper has a vertical slot 22, through which projects a scraping-arm 23, the heel of which is secured to a rod 21, contained and adapted to have an upward and

downward movement in the hollow standard 8. This scraping-arm 23 is of any suitable construction; but its point approaches closely to the inner surface of the basket-wall, so that during the vertical movement of the rod 21 it will exert a clearing action and assist the dislodgment and discharge of the material intermittently of the feed and contemporaneously with the discharge, as will be further explained.

The spider 16 is illustrated in Figs. 4 and 7. It is formed of the annular flange 17, which sustains the lower edge of the basket C, as already mentioned, and has a hub 16^a, fixed upon the hollow standard 8, and two alined radial arms 17^a, formed hollow and open at their under sides, preferably by setting two side walls thereof in V shape with the point upward, so as to avoid a horizontal plane surface at the upper surfaces of such arms, and thus lessen the chance of any permanent lodgment of material thereon. Any suitable number of supplementary radial arms 17^b may be employed to give the necessary strength to this spider 16, as shown in Fig. 7.

Referring to Fig. 4, it will be seen that two sets of pivoted links 24 25 are employed to couple the spider just described to an inverted-cup-shaped hub 26, formed in one with a horizontally-disposed gate 27, normally in contact with the hub 16^a and rim 17, and thus closing the orifices in the spider 16 from below, the spider, as well as the gate coupled thereto by the links 24 25, being adapted to have vertical as well as rotary movement upon the central hollow shaft 8. Suitable lugs are provided upon the hubs 16^a and 26 for pivotal connection with the inner ends of the links, which latter are pivotally connected, each set at their outer ends, so that they have a tong-like movement and action as the gate 27 is raised and lowered in the manner to be hereinafter described. The hub 26 forms one member of a central bearing for the gate 27, a loose collar 28, annular packing-ring 29, and wearing-plates (or antifrictional devices of any suitable nature) 30 forming the other members of the bearing, such packing-ring 29 being supported between flanges of the hub 27 and collar 28 by set-screws 31, and the plates 30 being located between the flat surfaces of the members 27 and 28, as shown in Fig. 4.

The vertical rod 21 preferably terminates at its connection with the scraper 23, and it may extend beyond the yoke-frame 10 and at this end form a rack 21^a, with the teeth of which meshes a pinion 32, firmly mounted on one end of a horizontal shaft 33, (hereinafter called the "rack-shaft,") carried in proper bearings on the yoke-frame 10 and upon vertical extensions 12^a of two of the three standards 12. The other extremity of the rack-shaft carries a pinion 34, which meshes with a vertically-sliding rack 35, supported by a bracket 36, extending from the outermost of the standard-

extensions 12^a. This rack has pivotal connection at its lower end with a rod 37, which extends to pivotal connection with a crank 38, fixed upon one extremity of a horizontal shaft 39, (hereinafter called the "lower gear-shaft,") arranged and supplemented as will be hereinafter explained, said crank 38 also having one end of a rod 40 pivoted thereto, and this latter rod is similarly coupled to a crank 41 on the outer end of a rock-shaft 42, (hereinafter called the "rocking shaft,") horizontally disposed below the base B and journaled, preferably, upon or near the main floor in such location that it will lie in a plane approximately at right angles to the central hollow standard 8 and just clear of same. This rock-shaft 42 has fixed upon it at or near its inner end a double-cam lever 43, (shown in Figs. 4 and 8,) the two members of which are disposed one at each side of the central standard 8, so that the rounded ends 43^a thereof will bear upon the under side of the member 28 of the central bearing when the gate 27 is in its upper position, closing the apertures in the spider 16, and so that the curved faces of such double-cam lever 43 may come into contact with the lower side of such central bearing during the lowering and raising movements of the gate 27, as will be clearly understood from Figs. 4 and 8.

Attached to the under side of the gate 27 or formed in one therewith at its outer edge or rim is a scraper-arm 27^a of suitable contour to effectually dislodge any material which may lodge against the inner walls of the base B and assist in its discharge through the outlet-spouts *b* as the gate 27 descends, the revolution of the basket C, spider 16, gate 27, and their connections being continued at all times during the operation of the machine, as will be further explained, causing the scraper-arm 27^a to traverse approximately the whole inner area or surface on the base B.

I will now describe a preferred construction and arrangement of mechanism in connection with the foregoing whereby the wet material is automatically and intermittently fed through the hopper H into the basket C. A vertical supply hopper or spout S feeds the wet material into a trough T, arranged horizontally and opening into and supported by the wall of the hopper H and containing a helical or screw conveyer V, mounted upon and rotating intermittently with a horizontal shaft 44, journaled in the yoke-frame 10 and upon two of the standards 12. This shaft (which is hereinafter called the "screw feed-shaft") carries a loose pinion 45 and a loose gear 46, arranged side by side and to be thrown simultaneously into action by a clutch 47, one member of which also runs loose, being mounted upon a sleeve 48 in common with said gears 45 and 46, and the other clutch member slidably mounted upon said screw feed-shaft 44 to be operated by means presently to be de-

scribed. Meshing with the gear 46 is a pinion 49, fixed upon another shaft, 50, parallel to the shaft 44 and journaled in the same standards (which shaft is called the "operating pulley-shaft") and carries a fixed pulley 51, as shown in Fig. 1. The pinion 45 meshes with a fixed gear 52 upon a shaft 53 parallel to the shaft 44 and journaled below same in the same standards, such shaft having also a fixed pinion 54 thereon, (and being hereinafter called the "connecting gear-shaft.") This pinion 54 meshes with a loose gear 55, carried by the lower gear-shaft 39, which latter carries a smaller loose gear 56, which in turn meshes with a gear 57, fixed upon another shaft, 58, (called the "cam-shaft,") journaled in the same two standards 12 and also carrying cams 59 and 60, as shown in Figs. 1, 2, and 3.

The cam 59 is that which acts with the clutch 47 in controlling the screw feed and acts through the medium of a roller 59^a on the end of a suitably-bent lever 59^b, pivoted to a bracket 12^b, extending from one of the standards 12, which has connection, preferably by means of a spring-controlled pin 59^c, with the clutch 47.

59^d is a supplementary spring-stop for assisting in maintaining the roller 59^a in contact with the cam 59, as clearly shown in Fig. 2.

The cam 60 is borne upon by a roller 60^a, having lever-and-spring connection with the movable part of a clutch 61 on the shaft 39, and brings the loose gear 55 into operative connection with the smaller gear 54, connecting gear-shaft 53, gears 52 and 45, and screw feed-shaft 44 at the proper intervals, connection also being had through this clutch 61 and shaft 39 with the cranks 38 and 41, by the rods 37 and 40 with the rack 35, rack-shaft 33, and rack 21^a on the vertically-movable rod 21, carrying the scraper-arm 23, and also with the rock-shaft 42, carrying the lifting-cams 43, so that the scraper 23 and gate 27 will be moved contemporaneously.

It is believed that the above-detailed description when read in close connection with the drawings will render the operation of my machine sufficiently clear of comprehension to those skilled in the art; but I may further explain that the centrifugal is first started by the application of power to the main driving-pulley 9. Then by the application of power from a suitably-situated counter-shaft (not shown) to the operating-pulley 51 the screw V delivers the first charge of water-laden material from the supply-chute S to the basket C, the continuous revolution of which quickly throws the water out through the foraminous walls thereof by centrifugal action. The mechanical movements being properly timed and apportioned, the gate 27 now falls with such dried material as may have lodged thereupon by the turning down of the cams 43, which happens directly the clutch 47 is thrown out and the clutch 61 thrown in, so as

to actuate the crank-arms 41 and 38. This movement of this latter operates the sliding rack 35 and through the rack-shaft 33 and its accessories allows the rod 21 to fall and carry with it the scraper-arm 23 connected thereto, and this by the continued revolution of the centrifugal insures that the point of the scraper will traverse the entire inner wall of the basket C from top to bottom and dislodge and project downward and outward all material adhering to said wall simultaneously with the dropping of the gate 27, the feed-screw V having meanwhile ceased operation by the throwing out of the clutch 47, as explained. Now through the gearing on the cam-shaft 58, lower gear-shaft 39, connecting gear-shaft 53, screw feed-shaft 44, and operating pulley-shaft 50, cam-shaft 58, and the cams before described and the throwing in of the clutch 61 reverse action is given to the rock-shaft 42 to lift the gate 27 again to its normal position, closing the bottom of the basket C, and to the rack-shaft 33 to raise the rod 21, and with it the scraper 23, to its normal position. (Shown in Fig. 4.) When this is accomplished, the clutch 61 is automatically thrown out and the clutch 47 thrown in, thus renewing the feed by the rotation of the screw V, and a fresh charge of wet material is delivered to the still continuously revolving basket C, and the intermittent operations above described are repeated and continued so long as the pulleys 51 and 9 are operated.

It will of course be remembered that the water is drained off through the spouts *a a* and the moisture-relieved material propelled by the assistance of the scraper or scrapers 27^a through the discharge-spouts *b b*. Thus it will be seen that at no time is the basket C laden with any undue or overheavy quantity of wet material, as is the case in centrifugals of ordinary construction, that no stoppage for the removal of the dried material is required at any stage of the operation, and that no attention beyond seeing that the supply-chute is always supplied with the material to be treated is necessary, the consequence being that the maximum speed of the centrifugal may be maintained continuously and that the supports and bearings thereof may be made as light as possible in accordance with the actual work to be performed.

The automatic intermittent feed devices may be uncoupled or dispensed with, and the wet material may be fed to the automatically-discharging centrifugal described by other means or by hand-labor without lessening the effectiveness of the means for automatically expelling the preponderance of moisture from any of the materials contemplated as requiring treatment in this way, and, further, it must be understood that while I have described and illustrated what I esteem to be a preferred and highly economical and effective construction and arrangement of devices for accom-

plishing the results in view I do not limit myself thereto or to any of the details set forth, as the same may be varied or modified according to different requirements and conditions without departing from the principle or sacrificing the advantages of the invention.

What I claim, and desire to secure by Letters Patent, is as follows:

1. In a centrifugal, the combination with a basket open at top and normally closed at bottom, and such basket being adapted for continuous rotation, of means for feeding separate charges of wet material through the open top into such basket, means for automatically discharging the moisture-relieved material through a temporarily-opened bottom of same, and instrumentalities connecting such feeding and discharging means whereby their action is made intermittent while the basket continues to revolve.

2. In a centrifugal moisture-expelling machine, the combination with a suitable supply chute or hopper, a casing, and proper bearings, and with a basket adapted for continuous rotation, of an intermittently-operating feed-screw, instrumentalities for causing said feed-screw to deliver separate charges of wet material from the supply chute or hopper to the basket, a gate normally closing the bottom of the basket, coupled thereto, adapted to revolve therewith, and also to have an intermittent vertical opening and closing movement in conjunction with the discharge of the moisture-relieved charges of material, and instrumentalities connecting said feeding and discharging devices in such manner that the feed will cease while the discharge takes place by the opening of the gate, and be resumed when said gate is closed.

3. In a centrifugal moisture-expelling machine, the combination with a suitable supply chute or hopper, a casing, and proper bearings, and with a basket adapted for continuous rotation, of an intermittently-operating feed-screw, instrumentalities for causing said feed-screw to deliver separate charges of wet material from the supply chute or hopper to the basket, a gate normally closing the bottom of the basket, coupled thereto, adapted to revolve therewith, and also to have an intermittent vertical opening and closing movement in conjunction with the discharge of the moisture-relieved charges of material, instrumentalities connecting said feeding and discharging devices in such manner that the feed will cease while the discharge takes place by the opening of the gate, and be resumed when said gate is closed, a scraping device impacting the inner wall of the basket and adapted to have a vertical movement within said basket contemporaneously with the movement of the gate, and instrumentalities connecting said scraping device with said gate.

4. In a centrifugal, the combination with a casing and suitable bearings and supports, and

with a basket having foraminous walls, fixed upper and lower spiders, and a vertically-opening and closing bottom or gate, of a hollow central standard having a vertical slot, a
 5 slidable rod within said standard having a scraper-arm projecting from its lower part through said slot and loosely impacting the inner basket-wall, and a rack at its upper part, a rack-shaft carrying a pinion meshing with
 10 said rack, a rocking shaft parallel with and below the rack-shaft, a cam on said rocking shaft impacting and adapted to raise the bottom gate, and instrumentalities connecting said rocking shaft and said rack-shaft, where-
 15 by they are actuated simultaneously and the scraper-arm is caused to move with the gate.

5. In a centrifugal, the combination with a casing and suitable bearings and supports, and with a basket having foraminous walls, fixed
 20 upper and lower spiders, and a vertically opening and closing bottom or gate, of a hollow central standard having a vertical slot, a slidable rod within said standard having a scraper-arm projecting from its lower part
 25 through said slot and loosely impacting the inner basket-wall, and a rack at its upper part, a horizontally-disposed rack-shaft carrying a pinion meshing with said rack, a rocking shaft parallel with and below the rack-
 30 shaft, a cam on the inner end of said rocking shaft impacting and adapted to raise the bottom gate, instrumentalities connecting said rocking shaft and said rack-shaft, whereby they are actuated simultaneously to cause the
 35 scraper-arm to move with the gate, a vertically-movable separate rack, and a pinion on the outer end of the rack-shaft meshing therewith, a crank on the outer end of the rocking shaft, pivoted rods connecting said separate
 40 rack and said crank, the whole being arranged so that the movement of the scraper-arm and the gate will be similar and simultaneous, substantially as set forth.

6. The combination with the centrifugal
 45 basket, having a vertically-movable gate, a central standard and proper supports and bearings, of a collar loosely surrounding the shaft and affording a base upon which the gate may revolve, a cam impacting the lower

side of said collar, and means whereby said
 50 cam is caused to raise said gate from its open to its closed position while the basket and gate continue to revolve, substantially as set forth.

7. In a centrifugal, the combination with a
 55 shell having water-outlets, a base having outlets for the moisture-relieved material, and with a rotatable basket having a vertically-movable bottom gate coupled thereto so as to
 60 rotate therewith, of a scraper-arm projecting from the under side of said gate and adapted to dislodge material from the inner walls of the base and to assist its discharge, substantially as set forth.

8. In a centrifugal, the combination with a
 65 basket adapted for continuous rotation and provided with a vertically-moving discharge-gate, and an internal scraper-arm adapted to move similarly and simultaneously with such
 70 gate, a supply chute, or hopper, and a device for feeding material therefrom to the basket, a clutch for causing such feed device to operate intermittently, suitable levers and a cam
 75 for actuating said clutch, a second cam in connection and moving with said first-named cam, suitable levers receiving motion from
 80 said second cam, a second clutch actuated by such levers, and suitable shafts, gearing, cranks, connecting-rods, and driving mechanism so arranged that during the continuous
 rotation of the basket separate charges of wet material may be fed to same intermittently of the movement of the discharge-gate and scraper-arm, substantially as set forth.

9. In a centrifugal, a basket made up of
 85 fixed top and bottom open frames or spiders and a foraminous wall consisting of a plurality of members lying close against each other, a plurality of external stiffening-bands, and internal reinforcing removable rings, substan-
 90 tially as and for the purpose set forth.

In testimony whereof I have signed in presence of two subscribing witnesses.

JOHN CAMPBELL MORRISON.

Witnesses:

J. C. DENISON,
 MARY MALLOY.