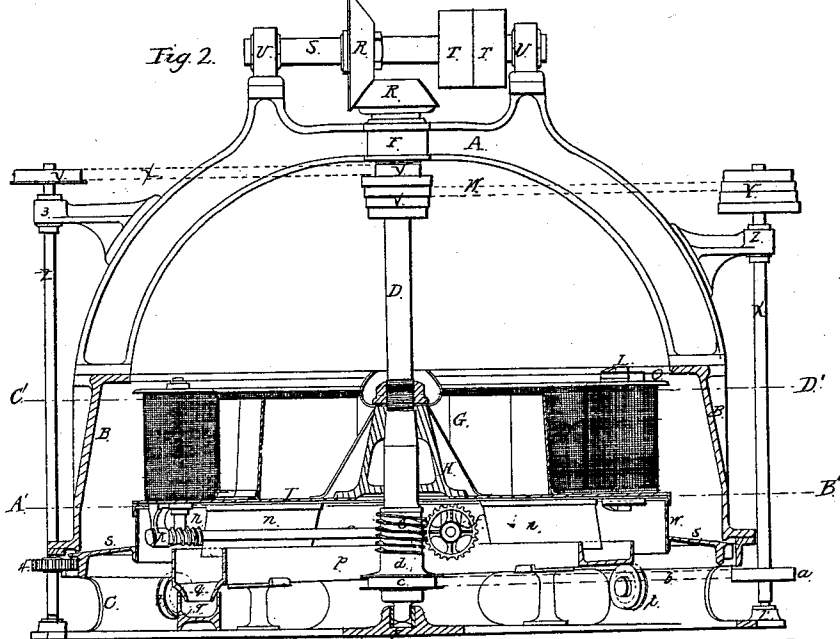
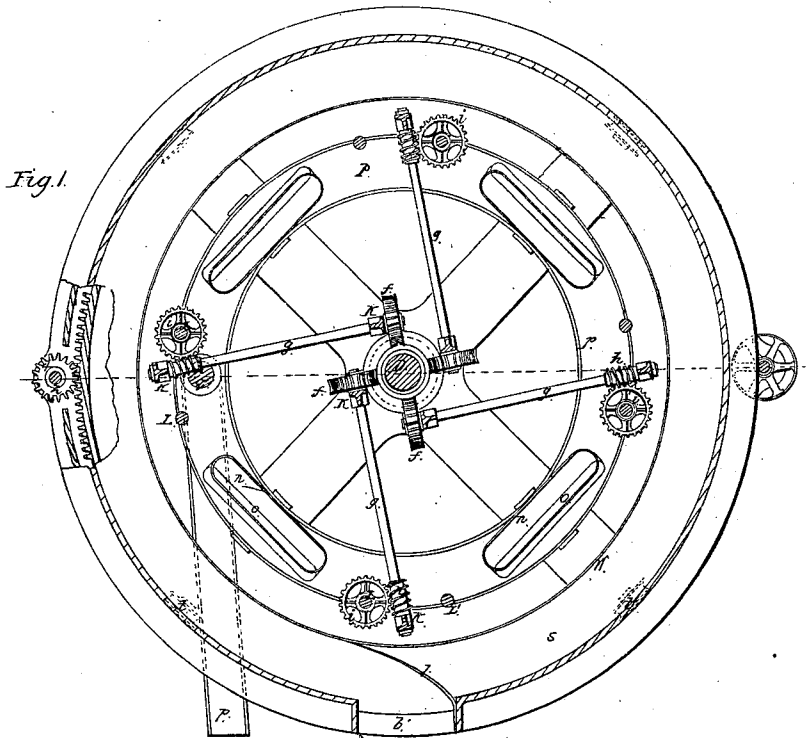


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CENTRIFUGAL MACHINE.

No. 96,304.

Patented Nov. 2, 1869.



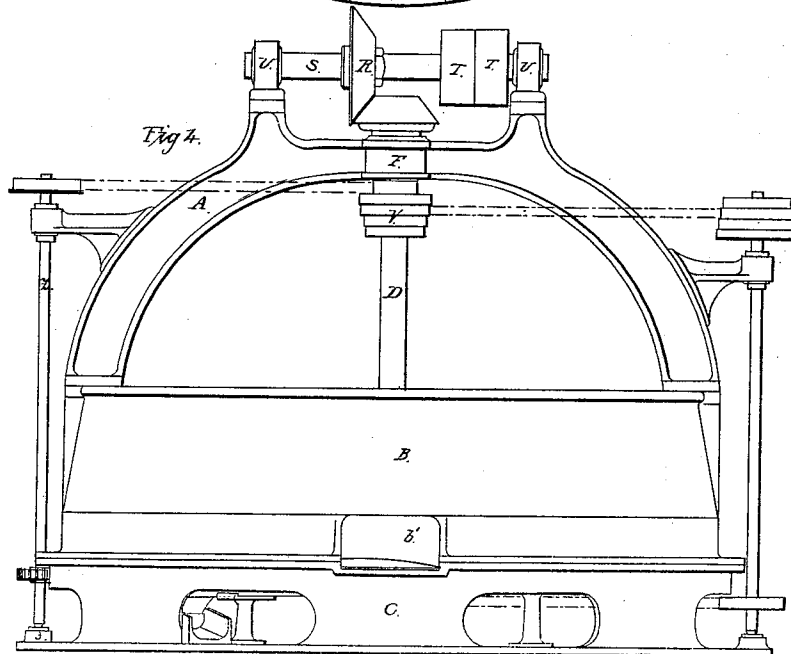
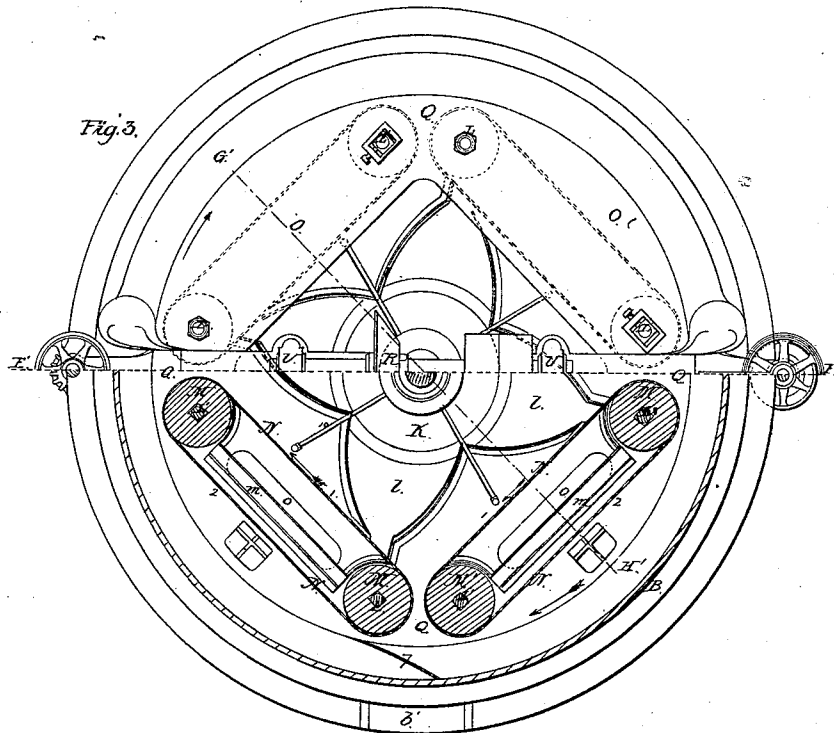
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Inventor:
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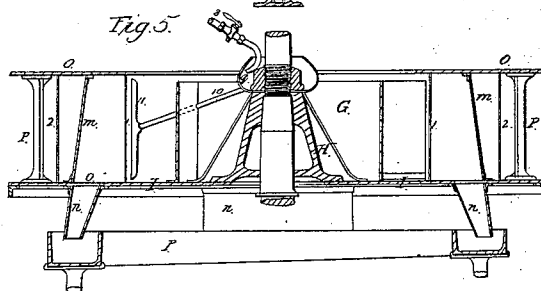
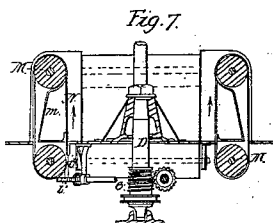
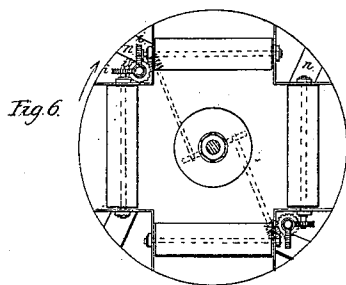
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United States Patent Office.

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Letters Patent No. 96,304, dated November 2, 1869.

IMPROVED CENTRIFUGAL MACHINE.

The Schedule referred to in these Letters Patent and making part of the same

To whom it may concern :

Be it known that I, JOHN FREDERICK BRINJES, of Fieldgate Street, Whitechapel, in the county of Middlesex, England, have invented certain new and useful Improvements in Centrifugal Machinery, or apparatus employed in the separation of fluid from other matters; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings.

My said invention relates to certain peculiar constructions and arrangements of what are generally known as "centrifugal machines," employed in sugar and other manufactories for separating fluid from other matters, and for drying-purposes, and has for its object the enabling such machines to be worked continuously, or without stoppages for the introduction of the substances to be operated upon, and for the subsequent discharge thereof. By this means, considerable economy in time is effected, and the great wear and tear hitherto attendant upon the frequent stoppage of the machine is prevented.

Another great advantage afforded by these improvements is the continuous self-cleansing, by centrifugal action, of the wire gauze, or perforated metal, or other suitable material, forming the straining-medium of the drum or vessel, without the necessity for using water or steam-jets, brushes, or other appliances.

In carrying out this invention, I make the wire gauze or straining-medium in the form of a number of endless bands or cylinders, disposed around the drum in such a manner as to enable such endless bands or cylinders to receive a travelling-movement of their own upon suitable carrier-rollers, or, in the case of wire-gauze cylinders, upon the axis of such cylinders, mounted upon the drum.

The several endless wire-gauze bands or cylinders may be arranged so as to travel or revolve either in a horizontal or vertical direction, and motion may be transmitted to them from the drum-shaft itself, by various mechanical contrivances, as will be obvious to the practical mechanic.

I have found, however, that a simple and effective mode of transmitting such independent travelling-motion to the endless bands or cylinders of wire gauze, is to mount a vertical shaft in suitable bearings outside the main frame, and to impart motion to such second-motion shaft by a strap from a cone-pulley on the main drum-shaft, a corresponding cone-pulley being mounted on the second-motion shaft.

A strap-pulley is secured to the lower end of the shaft last referred to, and a strap from it imparts motion, by means of a pulley, to a collar or tubular shaft, which revolves loosely on the lower portion of the main drum-shaft. This tubular shaft revolves slower than the drum, and has a worm formed thereon, and

into the said worm gear worm-wheels, fast on horizontal shafts, which are carried in bearings secured to the under side of the main drum, and, consequently, revolving with the drum.

On the outer extremities of these shafts, are provided other worms, which gear into corresponding worm-wheels mounted on the end of the axis of each cylinder of wire gauze, or other suitable straining-medium, or on the end of the axis of one of each pair of rollers which support the endless travelling-bands of wire gauze, (when bands are used,) and thus, on the rotation of the main drum, a comparatively slow rotatory motion will be imparted to the rollers, and their endless bands will be caused to travel slowly over them, so long as the revolutions of the main drum are maintained. A space is left between the carrier-rollers of each adjoining pair of bands, through which the sugar or other matter discharges itself, so soon as it is brought opposite thereto.

The substances which are fed into the drum are directed, through radial spouts, against one end of each of the travelling-bands of wire gauze, but by the time the fluid matter has been expelled, the substance has been carried by the movement of the endless wire gauze to one of the discharge-openings, and is instantly ejected, fresh sugar or other substance being fed in at the same time, thus rendering the process continuous.

The speed of the bands should, of course, be so regulated that the matters under treatment are sufficiently operated upon before being expelled.

As each endless band, during its return course, moves in an outer circle, and in a reversed position to that occupied by it when on the inner circle, it follows that any substances adhering to and clogging the gauze will be easily expelled by the action of the centrifugal force alone, such force operating on that part of the gauze which is, for the time being, out of action, in precisely the reverse direction to that in which it operated upon the same gauze when in action; consequently, the adhering substances are expelled from the same side of the gauze as that from which they first entered, but should the substance be of a gummy nature, a jet of steam, or hot water, or heated air, may be introduced, to assist in cleaning the gauze.

When the machine is used for sugar, and is necessary to liquor it, a pipe or pipes can be introduced for the supply of liquor, through a rose, between the point of supply and discharge of the sugar operated upon; and

In order that my said invention may be fully understood, I shall now proceed more particularly to describe the same, and, for that purpose, shall refer to the several figures on the annexed sheet of drawings, the same letters of reference indicating corresponding parts in all the figures.

Figure 1, on sheet 1, of my drawings, represents a sectional plan of one form of my improved centrifugal machine, as adapted for use in the manufacture of sugar, the section being taken along the line A' B', in fig. 2.

Figure 2 is a sectional elevation of the same machine, taken along the line E' F', in fig. 3.

Figure 3 is a half-sectional plan of the machine, the section part being taken along the line C' D', in fig. 2.

Figure 4 is a side elevation.

Figure 5 is a sectional elevation, showing a portion of the machine, taken along the line G' H', in fig. 3.

A is the main framing, which may be of any suitable form or material, resting upon the circular casing B, which is bolted down upon the bed or foundation-plate C.

D is the main vertical shaft, working, at its lower end, in the footstep-bearing E, in the base-plate, and at its upper end, in a collar-bearing, F, in the main framing A. This shaft carries the revolving drum G, which is secured thereto by the cast-iron boss H, bolted to the bottom plate I, of the drum, a sheet-metal cone, K, being fitted around such boss, for the purpose of deflecting outward the sugar or other substances, as they are fed into the centre of the drum.

Near the circumference of the plate I, which forms the lower portion of the drum, there is fitted an even number of upright spindles, L L', carrying rollers or pulleys M M', over which are stretched the endless wire cloths, or other suitable straining-material N N, which constitute the perforated walls or sides of the drum.

In my drawing, I have represented the drum as being provided with four of such endless wire cloths, but this number may obviously be varied if desired.

One of the rollers marked M, in each pair, serves as the actuating or driving-roller of the endless cloth, which passes partly round it, while the other roller (marked M') acts simply as a carrying-roller, and may revolve loose on its spindle.

Each driving-roller M is fast on its spindle L, which is driven or caused to rotate on its own axis during the revolutions of the drum, in the manner hereinafter more particularly described.

The upper ends of the several spindles L L' pass through the top annular plate O, of the drum, which plate is bolted down on to upright standards or brackets, P, figs. 3 and 5, of the desired height, such brackets being secured by bolts, or otherwise, to the lower plate I, of the drum.

A sufficient space or opening, Q, is left between the contiguous rollers M M', of each adjoining pair, for the discharge of the sugar or other substance as fast as the sirup or liquid has been expelled therefrom, through the straining-material, the discharge and supply both taking place continuously during the revolutions of the drum, and hence, stoppages are obviated.

The main vertical shaft which carries the drum is actuated by the bevel frictional gear R and driving-shaft S, provided with fast and loose driving-pulleys T T', and working in the bearings U U, cast on the main framing A.

Just below the collar-bearing of the upright shaft, or in any other convenient part thereof, there is keyed the cone driving-pulley V, from which a strap, W, transmits a slower motion to the vertical shaft X, through the reversed cone-pulley Y, fast on the upper end thereof.

This shaft X works in the collar and footstep-bearings Z Z', respectively, and carries, at or near its lower extremity, the driving-pulley a, which, by means of the strap or belt b, and pulley c, imparts rotatory motion to the short tubular shaft or collar d, which turns freely round, and upon the lower end of the main vertical shaft D, but at a slower rate than the main shaft.

This collar d has a worm or endless screw, e, formed thereon, which gears into the worm-wheels f f fast on the inner ends of the horizontal spindles g g, for driving or actuating the spindles L L of the rollers or pulleys M M, which actuate the endless wire cloths.

For this purpose an endless screw or worm h is fitted to or formed on the outer end of each of the horizontal spindles g, these worms gearing into worm-wheels i i, keyed on to the lower extremities of the spindles L L of the driving-rollers M M, and thereby imparting a slow rotatory motion thereto, and causing the endless wire cloths, or other straining-material, to travel slowly round their respective rollers during the revolutions of the drum G.

k k are bracket-bearings for carrying the horizontal spindles g g, such bearings being secured to the under side of the bottom plate I of the drum, and revolving therewith.

l l are a series of radial guiding-channels or spouts, (one for each endless travelling wire cloth,) the sides of such spouts being secured to the bottom plate of the drum, and so disposed and contracted at their outer ends, as to guide or direct the sugar or other substance to be operated upon against the rear end of each of the travelling wire cloths, which, when the drum is revolving, travel in the direction shown by the arrows in the drawing, and carry slowly along with them the sugar or other substance until it arrives at the openings Q Q, through which it is discharged.

During the time occupied by the sugar or other substance in travelling from one roller M to the other roller M' of the endless wire cloth, the sirup or other liquid is being expelled therefrom, through the wire work, by the centrifugal action of the drum.

By varying the speed of the travelling motion of the wire cloths, it is obvious that the sugar may be submitted to the centrifugal action of the drum for a greater or less period, according to requirement.

This adjustment or regulation of the speed of travel of the endless wire cloths is effected simply by changing the driving-strap or belt W from one-sized pulley to another, by which means the speed of the main driving-worm e is varied, and a corresponding variation is obtained in the speed of the travelling motion of the endless wire cloths.

The sirup or other liquid, which is expelled through the inner half 1 of the endless wire cloths, is directed against a slightly inclined plate, m, which is fixed between the rollers M M of each pair of rollers, and between the inner half 1 and outer half 2 of the endless wire-gauze cloth N.

While the inner portion 1 of the wire gauze is operating as a straining-medium, in the manner above described, the outer portion 2, which is travelling, of course, in the opposite direction to the inner portion 1, is being cleansed by the action of the centrifugal force alone, which readily expels or removes any solid substance which may be adhering to the gauze. This operation is greatly assisted by the fact that the position of this part of the gauze is reversed, that surface which was previously next to the interior of the drum, being now on the exterior, and consequently the adhering matter, in lieu of requiring to be forced through the gauze, is removed from the same side of the gauze as that by which it entered.

If desired or found necessary, the usual mode of cleansing by means of jets of warm water, steam, or heated air, may be employed.

n n are vertical spouts connected with suitable apertures o o, made in the bottom plate I of the drum, for the purpose of directing the separated liquid into any convenient receptacle.

I prefer, however, to collect such liquid in an annular trough, p, the bottom of which is inclined, and has a discharge-opening, q, made therein at its lowest part, which allows the liquid to flow out into an inclined

trough or gutter, *r*, which conveys it away to any desired locality.

The sugar or other solid substance, on being discharged through the openings *Q Q*, may be received on a revolving annular table, *S*, supported upon grooved anti-friction rollers *t*, carried by studs bolted to the side of the base-plate *C*, as shown in figs. 1 and 2.

w is an annular guard-plate attached to the inner circumference of the revolving table *S*, for the purpose of preventing the sugar or other substance from gaining access to the driving-gear underneath the bottom of the drum.

A rotatory motion is imparted to the annular table *S* by means of the strap *x*, pulleys *y y*, and vertical shaft *z*, which latter works in the bearings 3 3, and carries a spur-pinion, 4, gearing into corresponding teeth, 5, formed on the outer periphery of the annular table.

A discharge-opening, *v*, is made partly in the casing *B* and partly in the base *C*, through which the sugar, or other solid substance carried round on the table *S*, is directed, by means of the fixed inclined guiding-plate 7.

A pipe and stop-cock, 8, fig. 5, serve to supply liquor or water, as may be required. They communicate with an annular reservoir, 9, from which radiate pipes 10, provided perforated roses or jets 11, situated close to the straining-medium.

When hot air or steam is to be employed for drying or other purposes, it may be applied in a similar manner to liquor or water, but in lieu of the reservoir 9 being open, as shown, it should in such case be closed at the top.

Figures 6 and 7 represent, respectively, a plan and sectional elevation of a portion of a centrifugal machine, wherein the endless travelling bands of straining-material *N* are caused to travel in a vertical direction, in lieu of horizontally, as illustrated by the figures hereinbefore referred to.

In this arrangement the special discharge-openings *Q*, before described, may be dispensed with, as the sugar, or other substance operated upon, will discharge itself over the top of the upper or driving-roller *M* of each vertical endless travelling band of straining-material *N*.

The sugar, or other substance to be operated upon, is directed by radial spouts somewhat similar to those shown at *l* in the figures previously referred to, but not shown in figs. 6 and 7.

These spouts, in the latter arrangement, should be made to dip down to the bottom of the drum, so as to direct the sugar or other substance to the lower portion of each of the ascending sides of the vertical travelling bands.

The sirup or other liquid, as it is expelled, strikes against the plate *m*, and is caught in a trough, from which it is discharged in a horizontal direction through the horizontal spouts *n*.

The driving-roller *M* of each endless band is driven from the worm *e*, on the central shaft *D*, as before described; but in lieu of the worms *h* gearing directly to the worm-wheels *i*, fast on the axis of the rollers *M*, they gear into intermediate worm-wheels *i'*, carried on two short upright spindles *i''*, from which motion is transmitted directly to the worm-wheels *i* on the axis of each roller *M*, by worms on the upper ends of the upright spindles *i'*.

The rest of the letters in these two figures correspond to the same parts in the figures previously described, and need not, therefore, be further referred to.

Claims.

1. The general construction and arrangement of what are known as "centrifugal machines," whereby they may be worked without stoppages, and so as to admit of the continuous introduction and discharge of the substances to be operated upon, substantially as hereinbefore described, and illustrated by my drawings.

2. The mode of driving or actuating the wire gauze, or other suitable straining-medium of centrifugal machines, when applied in the form of endless travelling bands, moving either in a horizontal or vertical direction during the revolution of the drum, substantially in the manner and for the purpose hereinbefore described.

3. The application of the wire gauze, or other suitable straining-medium of centrifugal machines, in the form of cylinders, composed of wire gauze, perforated metal, or other equivalent material, such cylinders being caused to rotate on their own axis during the revolution of the drum, substantially in the manner and for the purpose hereinbefore described.

4. The combination, in centrifugal machines, of endless travelling bands, of wire gauze or other equivalent material, or of rotatory cylinders, composed of the same material, with suitable discharge-openings disposed at intervals round the drum, substantially as and for the purpose hereinbefore described.

5. The application and use of the radial spouts or channels, for directing the substances which are fed into the drum against one end or portion of the endless travelling bands or rotating cylinders of wire gauze, or other suitable straining-medium, substantially as hereinbefore described.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN FREDERICK BRINJES.

Witnesses:

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