

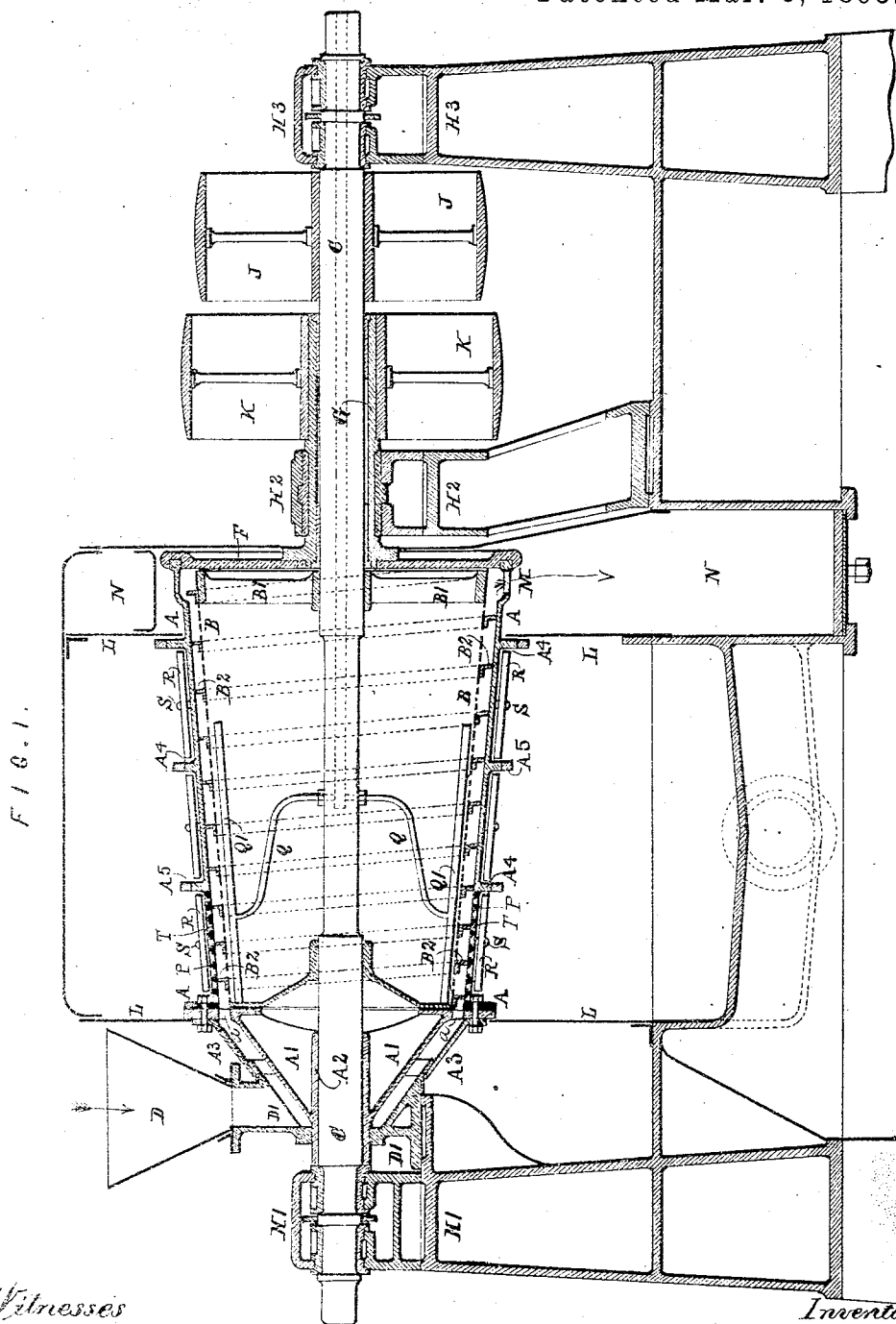
(No Model.)

2 Sheets—Sheet 1.

D. STEWART.
CENTRIFUGAL APPARATUS.

No. 535,306.

Patented Mar. 5, 1895.



Witnesses
George Baumann
S. C. Connor

Inventor
Duncan Stewart
By his Attorneys
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(No Model.)

2 Sheets—Sheet 2.

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FIG. 2.

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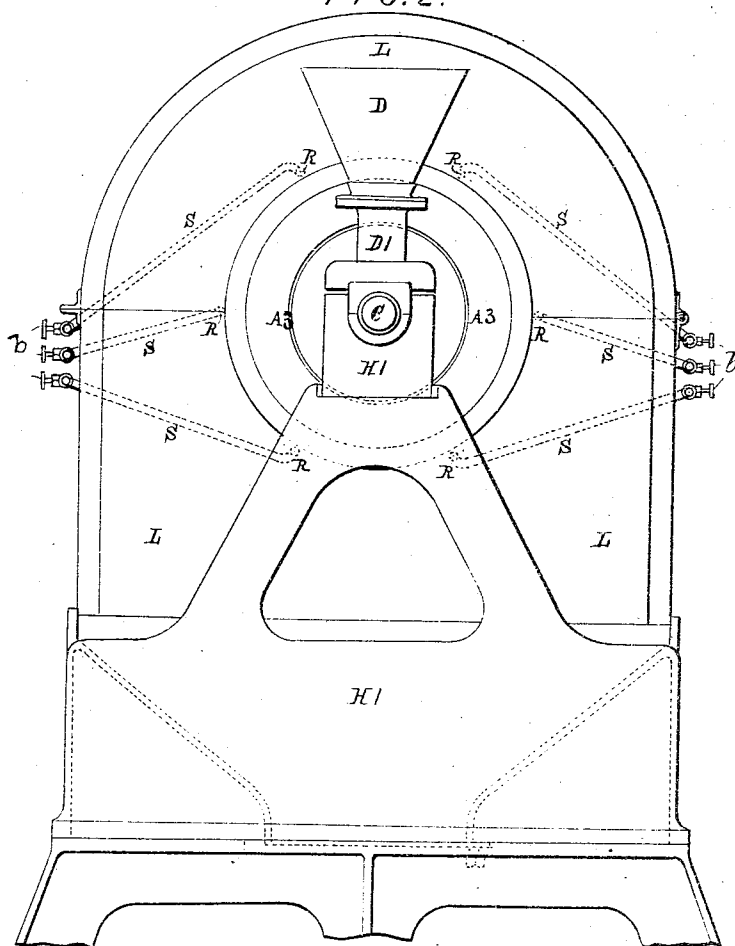


FIG. 3.

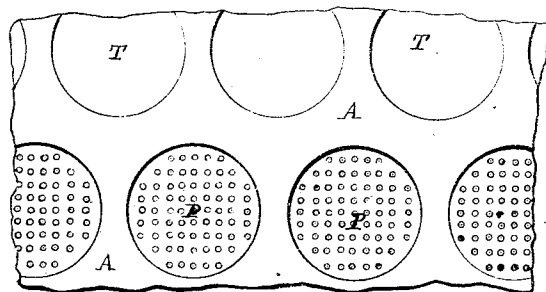


FIG. 4.



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UNITED STATES PATENT OFFICE.

DUNCAN STEWART, OF GLASGOW, SCOTLAND.

CENTRIFUGAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 535,306, dated March 5, 1895.

Application filed November 16, 1894. Serial No. 529,027. (No model.)

To all whom it may concern:

Be it known that I, DUNCAN STEWART, a subject of the Queen of Great Britain and Ireland, and a resident of Glasgow, Scotland, have invented certain Improvements in Centrifugal Apparatus, of which the following is a specification.

My said invention has for its object to construct centrifugal apparatus in an improved manner so that it may operate continuously and satisfactorily for drying and purifying sugar or other crystalline or granular matters and generally be capable of expeditiously and satisfactorily separating the liquid and solid constituents of mixtures comprising a considerable quantity of liquid.

Centrifugal apparatus, as made with my improvements, is shown on two accompanying sheets of explanatory drawings.

Figure 1, on Sheet 1, is a longitudinal vertical section, Fig. 2, on Sheet 2, being an elevation as at right angles to Fig. 1, and Figs. 3 and 4, being respectively an elevation and a section, as at right angles to each other, of details hereinafter described.

In the drawings, the same reference letters are used to mark the same or like parts wherever they are repeated.

In the carrying out of my invention, I place the rotating basket, A, with its axis horizontal, and arrange within it a hollow drum, B, fixed on a central shaft, C, and leaving an annular space between its outer surface and the inner surface of the basket, A. The basket, A, and inner drum, B, are made tapering or slightly conical in form, and the moist sugar or other crystalline or granular matter is introduced between them at the smaller end.

To insure the proper distribution of the sugar or other matter when being introduced, it is fed from a stationary hopper, D, into a fixed receptacle, D', which encircles a cone, A', fixed to the smaller end of the basket, A, this cone being made with an elongated tubular center or boss, A², which bears on the central horizontal shaft, C. The feeding-in receptacle, D', is at the outer and smaller end of the cone, A'; the latter thus extending into the feeding-in receptacle below the bottom of the hopper and the cone has fixed to it an outer conical shell, A³. Between the shell, A³, and a conical part of the hopper receptacle, D',

and the body of the cone, A', there is an annular conical space the smaller part of which communicates with the feeding hopper, D, while the larger part communicates through apertures, a, with the space between the basket, A, and inner drum, B. The sugar or matter entering at the smaller part of the cone, A', is by the centrifugal action due to the rotation spread over the cone and carried into the space between the basket, A, and inner drum, B.

The inner drum, B, is fixed on the central shaft, C, by means of arms, B', and it is perforated throughout as indicated in Fig. 1, to allow air free access from its interior into the annular space. On the outside of the inner drum, B, helical blades, B², are fixed for controlling the movement of the sugar or other matter from the smaller to the larger end of the basket, A, there being a suitable difference between the speeds of the basket and inner drum to effect the proper action of the helical blades. The helical blades, B², are made of a large pitch at the larger part of the basket, A, so that the sugar or other matter may move more quickly along at that part. The basket, A, is by means of a disk, F, at its larger end fixed on a tubular shaft, G, through which the central shaft, C, extends. The shafts, C, and G, are supported in the necessary bearings, H¹, H², and H³, and each has on it a separate pulley, J, K, for a driving belt. The pulley, J, on the central shaft, C, is made smaller so that the speed of the inner drum, B, may be less than the speed of the basket, A, to allow of the action of the helical blades, B², hereinbefore mentioned.

The basket, A, made by preference of cast brass, is shaped and turned with all possible accuracy and it is encircled by flanges, A⁴, which are bound by steel rings, A⁵, the end flanges projecting in such manner as to prevent escape of liquid through the end openings in the casing, L, which incloses the basket and receives the liquid thrown through the walls of the basket by the centrifugal action. The sugar or other matter dried by the centrifugal action is delivered at the larger end of the basket, A, through circumferential openings, M, into a separate compartment or casing, N, provided to receive it.

Provision is made for causing a spray of

water with or without steam or of any suitable liquid to act internally on the sugar or other matter while in the basket, A, for the purpose of cleansing or purifying it, and provision is also made for directing sprays or jets of water or other fluid upon the outside of the basket, A, for the purpose of keeping the perforations, P, (Figs. 3 and 4) through the sides of the basket clear.

For the internal spray action the central shaft, C, is made tubular and water or other fluid is introduced through the tubular part of the shaft, whence it is led by branch pipes, Q, to pipes, Q', which extend along close to the inside of the inner drum, B, and are perforated on their outer sides.

For the external sprays or jets sets of longitudinal pipes, R, are arranged at a suitable distance from the basket, A, and are perforated so as to direct spray or jets upon the basket. In each set there are six or other suitable number of the perforated pipes, R, arranged equidistantly around the basket, A, and each set is supplied by different branch pipes, S, having on them if desired, separate regulating valves, b. One set of the spray pipes, R, operates on the smallest part of the basket, A, another set or sets on intermediate parts and a set on the largest part, and the treatment of each part can be separately modified as may be found desirable in practice.

The basket shell, A, is by preference perforated in the following manner: Circular recesses, T, Figs. 3 and 4, are countersunk in the outer side of the shell and then a series of perforations, P, of suitable small size to take the place of the ordinary wire cloth are made through the bottom or thinner metal of each recess, the thicker metal between the several recesses giving ample strength to the whole. These recesses and perforations are shown

in detail upon enlarged scale in Figs. 3 and 4 and in a fragmentary section of the shell, Fig. 1; they are shown upon a scale exaggerated with reference to the scale of the other parts of said figure.

What I claim is—

1. In centrifugal apparatus for continuously drying and purifying sugar or other crystalline or granular matters and generally for separating liquids and solids and comprising an outer basket and an inner drum on horizontal shafting, feeding apparatus consisting of a stationary hopper and feeding-in receptacle with a cone fixed to and rotating with the basket and extending into said receptacle below the bottom of the hopper and an outer conical shell also carried by the basket leaving an annular conical space through which the materials are distributed to the entering end of the space between the basket and drum, substantially as herein set forth.

2. In centrifugal apparatus, a basket consisting of an internally turned metal shell having recesses countersunk in its outer side, the bottoms of each recess having a series of fine perforations taking the place of the usual wire cloth, substantially as herein set forth.

3. Centrifugal apparatus having means for spraying fluid on the inside of the inner drum and consisting of a hollow shaft with branch pipes leading therefrom and pipes extending from said branches along and close to the inside of the inner drum, substantially as described.

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

DUNCAN STEWART.

Witnesses:

EDMUND HUNT,
DAVID FERGUSON.