

No. 636,780.

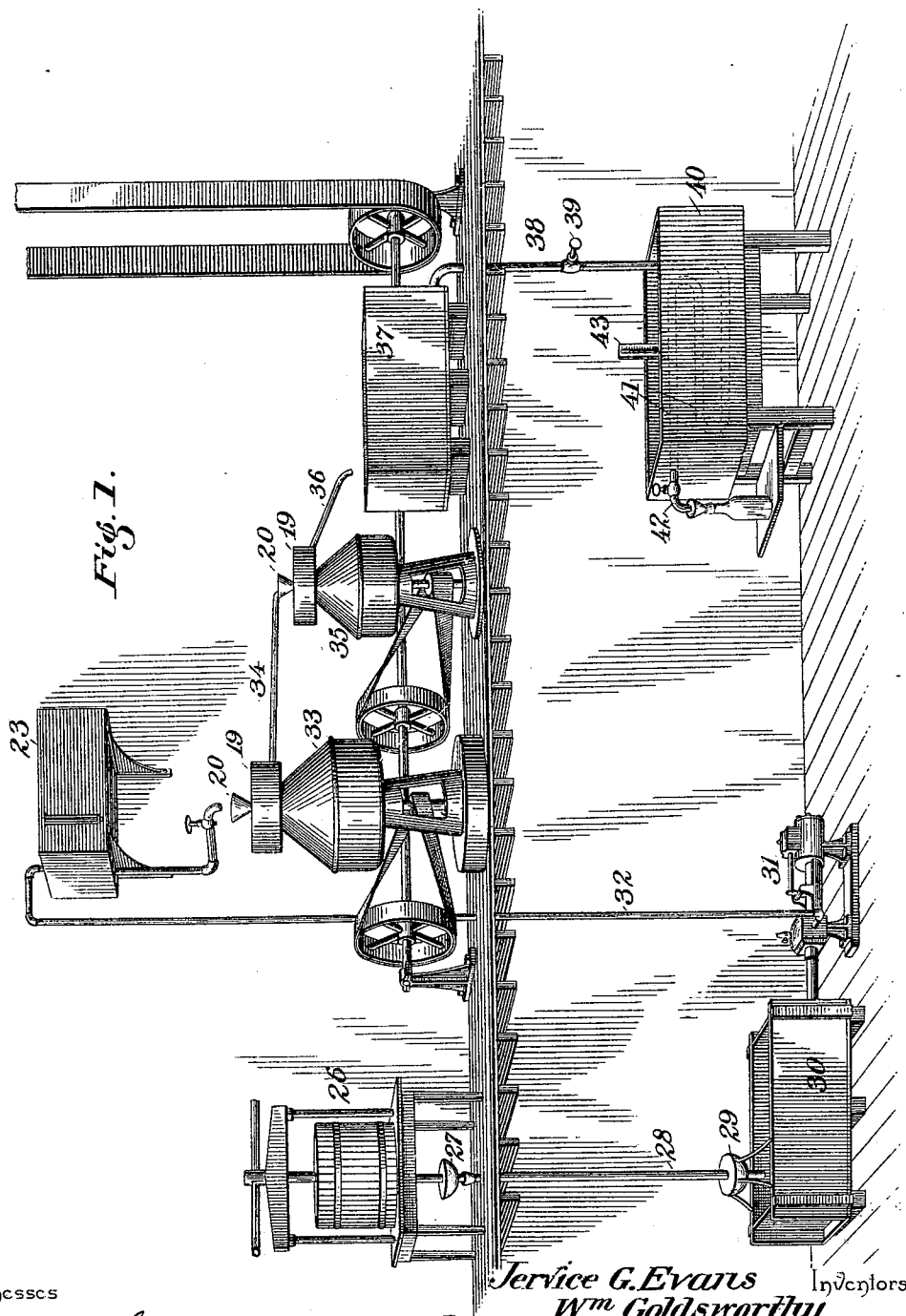
Patented Nov. 14, 1899.

J. G. EVANS & W. GOLDSWORTHY.
CENTRIFUGAL MACHINE.

(Application filed Apr. 12, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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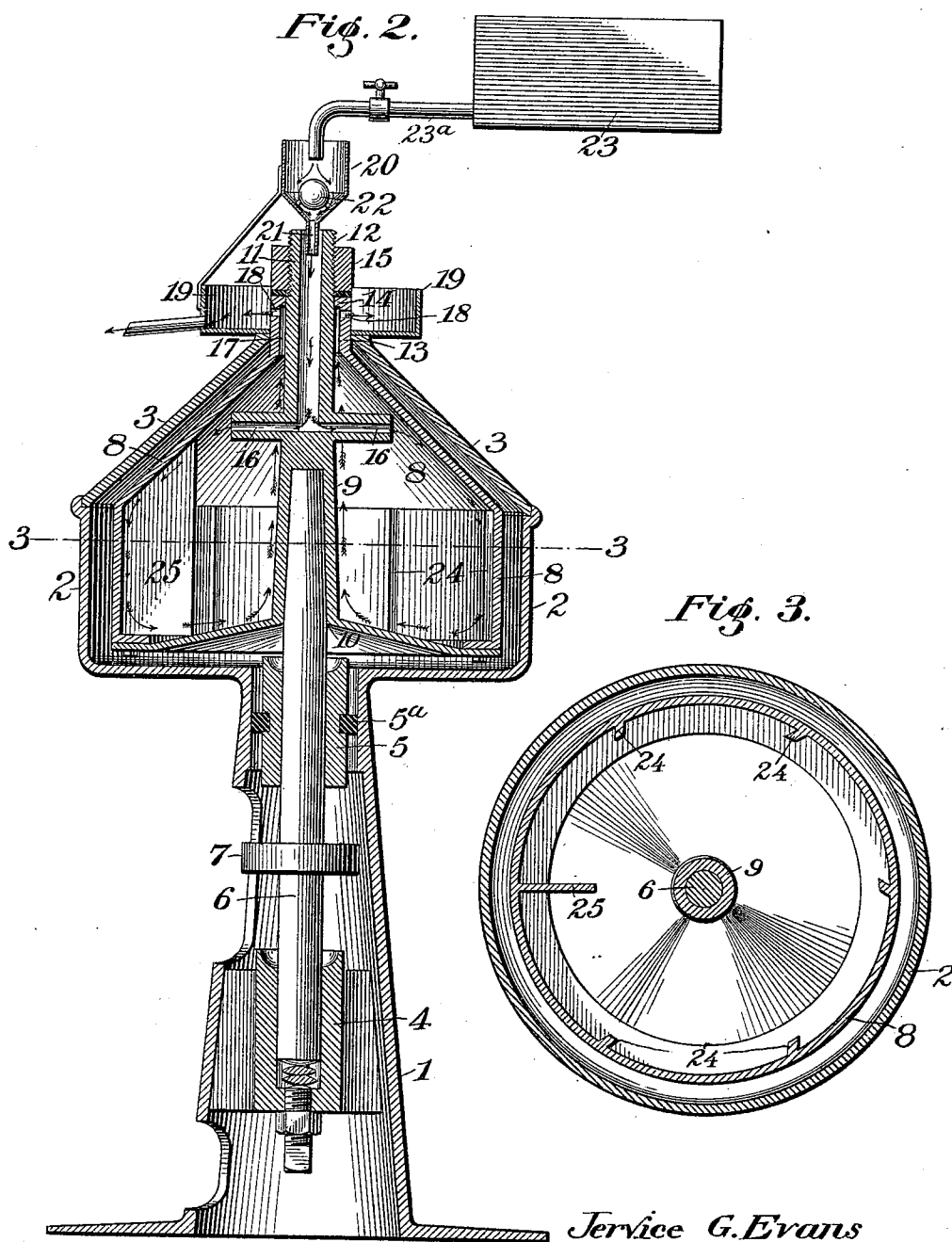
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(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

JERVIC G. EVANS AND WILLIAM GOLDSWORTHY, OF ABINGDON, ILLINOIS.

CENTRIFUGAL MACHINE.

SPECIFICATION forming part of Letters Patent No. 636,780, dated November 14, 1899.

Application filed April 12, 1898. Serial No. 677,330. (No model.)

To all whom it may concern:

Be it known that we, JERVIC G. EVANS and WILLIAM GOLDSWORTHY, citizens of the United States, residing at Abingdon, in the county of Knox and State of Illinois, have invented a new and useful Apparatus for Refining Fruit-Juices, of which the following is a specification.

Our invention relates to an apparatus for refining fruit-juices to keep them from fermentation—such as the juices of grapes, apples, and many other kinds of fruits; and the leading thought of the invention is to rapidly treat fruit-juices to eliminate the fermentable properties therefrom, as well as to extract all solids and impurities, so as to keep the treated extract in an unfermented condition for an indefinite period.

With these ends in view the invention consists of a centrifugal separator especially constructed for refining fruit-juices, in which we employ a revoluble bowl closed on all sides except at the upper end, which constitutes an outlet for the treated juices, means for feeding the crude juices into the bowl below the outlet therefor, retaining-wings on the inner surface of said bowl and arranged to afford places for the lodgment of the impurities mechanically separated from the juice, and a stirrer carried by the bowl.

The invention further consists in the novel combination of elements and in the construction and arrangement of parts which will be hereinafter fully described and claimed.

To enable others to understand the invention, we have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a general view of a system for carrying out our process and including as parts thereof centrifugal separators constructed in accordance with our invention. Fig. 2 is a vertical sectional elevation of a centrifugal separator modified in its construction to adapt it for the purposes of our invention. Fig. 3 is a horizontal sectional view on the plane indicated by the dotted line 3 3 of Fig. 2.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

We will now proceed to describe the centrifugal separator, which is of novel construction to fulfil the purposes of the machine to eliminate the solids and other impurities contained in fruit-juices as they come from the press and are prepared or treated in accordance with our invention, reference being had more particularly to Figs. 2 and 3.

1 designates a stand which is fixed in a suitable way to the floor, and at its upper end this stand is provided or formed with a centrifugal casing 2, which is rigid or immovable with the stand. To the casing is fitted a removable cover 3, preferably dome-shaped, as shown by Fig. 2, and said cover is seated in a suitable way on the casing. In the lower end of the stand is provided a step-bearing 4, and in the stand, adjacent to the casing 2, is a journal-bearing 5, which is in vertical alignment with the stop-bearing and is equipped with an elastic cushion-ring 5^a, that enables the bearing to yield or give under the influence of the rapidly-rotating spindle 6. The lower end of this spindle is stepped in the bearing 4, and the spindle passes through the bearing 5 into the casing 1 a suitable distance to receive the revoluble bowl. The spindle is provided at a point intermediate of its length with a pulley 7, around which passes a belt adapted to impart the necessary high speed to the spindle which carries the revoluble bowl 8. This bowl is closed on all sides, including its bottom, annular wall, and conical head. A hollow spindle 9 constitutes a part of the revoluble bowl, within which said spindle occupies a central or axial relation, and the lower end of this hollow spindle forms a socket 10, in which is received the upper extremity of the driving-spindle 6, that is rigidly fastened in a suitable way to said hollow spindle of the bowl. The hollow spindle 9 passes upwardly above the bowl and the cover of the casing, so as to protrude through or beyond said parts, and said protruding end 11 of the hollow spindle is exteriorly threaded, as at 12. The dome-shaped or conical head of the revoluble bowl terminates in a tubular neck 13, the upper extremity of which is formed with an inwardly-extending flange 14, that is adapted to fit snugly or tightly to the protruding end 11 of the hollow spindle, and on said threaded protruding end of the spin-

dle 9 is screwed a nut 15, which binds upon the tubular neck of the bowl to clamp the bowl and spindle rigidly together at their upper ends.

5 Projecting radially from the hollow spindle 9 are a series of hollow arms 16, which are preferably integral with said spindle and are formed thereon or attached thereto at a point below the tubular neck of the bowl. These
10 hollow arms 16 lie radially to the tubular-bowl spindle, and the passage in said arms communicates with the central bore or passage of the tubular spindle, thus providing a continuous inlet for the crude fruit-juice, which is supplied or fed to the spindle 9, as
15 will presently appear. The tubular neck of the bowl is of a larger diameter than the tubular spindle above the hollow arm 16, and as the spindle is concentric with the bowl an annular outlet-passage 17 is provided from
20 the bowl to the radial ports 18, which are formed in the tubular neck at a point below the clamping-nut 15.

A receptacle 19 surrounds the tubular neck
25 of the bowl where it projects through the dome 3 of the casing, and the treated liquid from the bowl is adapted to pass through the passage 17 and ports 18 into the receptacle 19.

Above the tubular spindle 9 of the bowl is
30 a feed-funnel 20, which is supported in axial alinement with said spindle by suitable arms or braces, which serve to sustain the funnel out of contact with the spindle, and from the bottom of this funnel extends a spout 21,
35 adapted to convey the crude fruit-juice into the axial passage or bore of the spindle 9, from whence the juice flows through the arm 16 into the bowl. To insure uniform feed of the fruit-juice to the spindle 9 a distributor
40 22 is arranged within the feed-funnel 20, and said distributor is preferably of globular form, seated on suitable supports fixed within the funnel above the spout 21. The fruit-juice to be supplied to the separator is fed to the
45 hopper 23, supported in an elevated position above the separator and provided with a valved spout 23, the delivery-orifice of which is immediately over the globular distributor 22 for the purpose of discharging the juice
50 directly upon the distributor.

Within the revoluble bowl 8 is provided a series of short collector-ribs 24, which are secured in vertical positions to an annular wall of the bowl and extend inwardly there-
55 in, preferably on tangential lines, although said ribs may be disposed in radial positions within the bowl. These collector-ribs are spaced at suitable intervals around the circumference of the bowl, and they afford shoulders for the lodgment of the impurities con-
60 tained in the fruit-juice which is supplied to the bowl, said ribs serving to retain the impurities which are mechanically separated from the juice by the centrifugal action of the revoluble bowl. An agitator-wing 25 is
65 also secured within the bowl to extend radi-

ally therein for a suitable distance, and this agitator-wing is of greater width than the collector-ribs 24 for the purpose of making it extend well into the bowl toward the hol-
70 low spindle 9 and break up the whirling current of the liquid within the bowl.

From the foregoing description it is appar-
ent that the liquid in its crude condition may be fed continuously and in regulated vol-
75 umes from the feed-hopper 23 to the funnel 20 and thence into the hollow spindle 9, from whence the liquid flows through the radial arms 16 into the bowl, said arms being positioned to discharge the liquid against the
80 dome-shaped head of the bowl and down along the annular wall thereof. The spindle 6 being rotated at a high rate of speed, it carries the revoluble bowl with it, and the centrifugal action of the rotary bowl impels the
85 liquid contents of the bowl to follow the course indicated by the arrows in Fig. 2. The impurities being heavier than the liquid which it is desired to preserve, they are
90 thrown radially by centrifugal action against the annular wall of the bowl, and such impurities lodge against the collector-ribs 24, which serve to retain the impurities from accumulating in the liquid. The agitator-wing
95 25 intercepts the whirling current of liquid, so as to break up the current, and the liquid, after separation from its impurities, flows through the central outlet-passage 17 and
ports 18 into the receptacle 19.

In Fig. 1 of the drawings we have illus-
100 trated a plant or system for refining fruit-juice in accordance with our invention, and reference will now be had to the various instrumentalities which constitute the plant
105 adopted by ourselves for refining the fruit-juice. The press, in which the liquid is extracted mechanically from the pulp, is indicated at 26, and the liquid is delivered into an upper strainer 27, from which leads a pipe
110 28, that delivers to a second strainer 29. This strainer delivers to a tank 30, operatively connected with the lifting-pump 31, from which leads a pipe 32, that is adapted to convey the crude juice to the feed-hopper 23 of the first centrifugal separator. (Indicated at 33.) The
115 liquid, after being subjected to the action of this separator 33, is delivered into its receptacle 19, to which is connected a pipe 34, which leads to the feed-funnel 20 of the second centrifugal separator 35. An off-bearing pipe 36
120 extends from the receptacle 19 of the separator 35 to a storage-tank 37, and from the bottom of this tank 37 extends a pipe 38, having a regulating-valve 39. 40 indicates a heating-tank which is of any suitable construction
125 and is adapted to contain a body of hot water, which may be supplied to said tank from a boiler or other suitable source, and in this heating-tank is arranged a coil 41, which is operatively connected with the pipe 38 and
130 terminates in a valved nozzle 42, adapted to discharge the liquid into suitable bottles.

This heating-coil 41 is equipped with a thermometer 43, which indicates the temperature of the liquid passing through the coil.

In the operation of the plant or system the liquid is extracted from the pulp by the press, and its impurities are removed partially by the strainers 27 and 29 as the liquid passes to the first tank 30. The liquid is pumped from this tank to the feed-hopper 23, from whence it flows through the pipe 21 into the separator 33. The liquid is subjected to centrifugal action in the two separators 33 and 35 to effectually eliminate the impurities therefrom, and the treated liquid is conveyed from the tank 37 to the heating-coil 41 by means of the pipe 38. This heating-coil 41 is immersed in a hot-water bath. The liquid as it passes through said coil is heated to a temperature of about 195°. We have found that the temperature specified is sufficient to destroy the germs of fermentation contained in the juice, and it will be seen that this treatment not only thoroughly extracts all the solids and impurities from the juices, but it leaves the juice in a perfectly-refined condition to overcome the action of the natural acid contained in the juice without affecting or disturbing the saccharine properties, color, or flavor of the juice.

We are aware that changes in the form and proportion of parts and in the details of construction may be made by a skilled mechanic without departing from the spirit or sacrificing the advantages of the invention, and we therefore reserve the right to make such modifications as clearly fall within the scope of the invention.

Having thus described the invention, what we claim is—

1. A centrifugal separator for clarifying fruit-juices, comprising a revoluble bowl, a series of vertical collector-wings fast with the bowl and extending inwardly from the annular wall thereof for the lodgment of solid impurities eliminated centrifugally from the juice under treatment, a breaker-rib fast with the annular wall of said bowl and projecting inwardly therefrom to terminate beyond the inner edges of adjacent collector-wings, and means for admitting unclarified juice to, and discharging clarified juice from, said bowl, substantially as described.

2. In a centrifugal separator for clarifying fruit-juices, a revoluble bowl provided below its inclined top with the series of vertical collector-wings which are fast with, and extend inwardly from, the annular wall of said bowl, and also provided with the tubular discharge-neck having radial ports therein, combined with a central feed-tube passing through the neck of said bowl and having an open threaded upper extremity which protrudes from said bowl, a washer resting on the neck of the bowl, a clamping-nut screwed on the tube to confine the washer in place, means for supplying unclarified juice to the feed-tube, and a receiving vessel surrounding the neck of the bowl to receive the clarified juice from the ports therein, substantially as described.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

JERVIC G. EVANS.
WILLIAM GOLDSWORTHY.

Witnesses:

A. W. COCHRAN,
ADAM COCHRAN.