

No. 612,317.

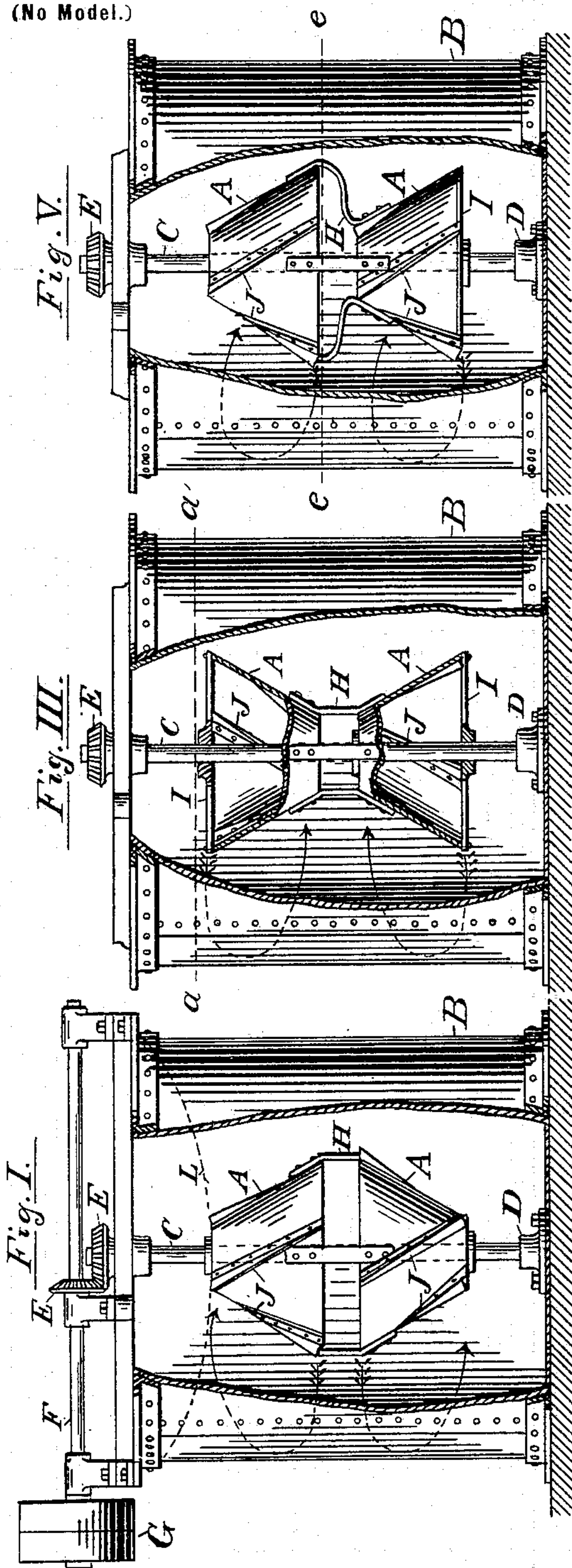
P. F. DUNDON.

Patented Oct. 11, 1898.

MIXING MACHINE.

(Application filed Dec. 27, 1897.)

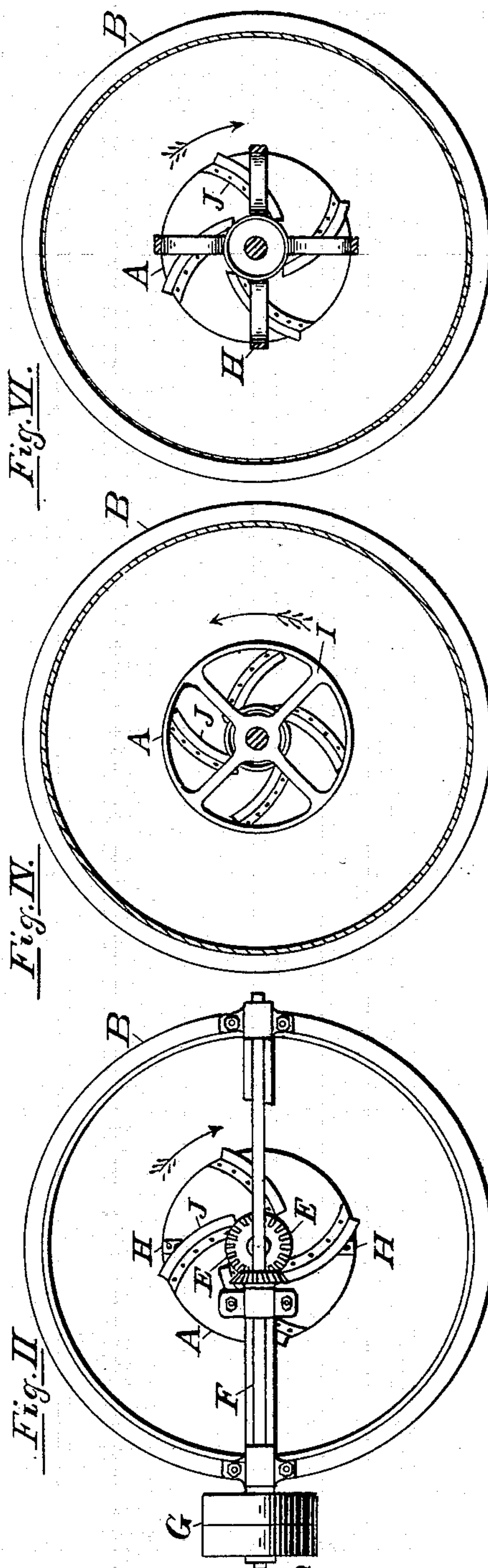
(No Model.)



Witnesses

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UNITED STATES PATENT OFFICE.

PATRICK F. DUNDON, OF SAN FRANCISCO, CALIFORNIA.

MIXING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 612,317, dated October 11, 1898.

Application filed December 27, 1897. Serial No. 663,579. (No model.)

To all whom it may concern:

Be it known that I, PATRICK F. DUNDON, a citizen of the United States, residing at San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Mixing and Blending Machines for Liquids; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to devices for mixing together and blending liquids of different kinds and for dissolving in liquids material of any kind soluble thereby, also for extracting gases or volatile matter from liquids by means of agitation and a peculiar flow and action of the fluids.

My improvements consist of a containing vessel or tank of a suitable size or shape to contain the volume of fluid to be treated. Placed in this vessel or tank is a revoluble impeller or impellers of conical form, preferably provided with helical vanes on the outside or inside, or both, by means of which the liquid around the impeller is set in rotation about the axis of the impeller with different degrees of centrifugal force in different planes, producing an involute action of the fluid outward around the periphery and inward toward the center of the containing vessel, as hereinafter more fully explained. To these ends I construct machinery and devices, as illustrated in the drawings herewith, in which—

Figure I is a side elevation of a mixing and blending machine made according to my invention set in a tank, a portion of the front of which is broken away to show the impellers. Fig. II is a plan view of Fig. I. Fig. III is a view similar to Fig. I, with the impellers inverted. Fig. IV is a transverse section of Fig. III on the line *a a*. Fig. V is another elevation similar to Fig. I, with two conical impellers set in the same position relatively. Fig. VI is a transverse section through Fig. V on the line *e e*.

The several illustrations show different ways of arranging the conical impellers A and indicate the direction of the involute flow set up thereby.

The tanks B, which are in this case shown

as plain cylindrical vessels deep enough to admit two impellers A, are large enough to permit involute or radial and inward flow caused thereby, as indicated by arrows on the left.

The impeller A, of which there may be two or more arranged in pairs, is mounted on the shaft C, having a step-bearing D at the bottom, and is driven by the gear-wheel E, shaft F, and pulleys G, as seen in Figs. I and II, but may be suspended, having all the bearings above the fluid.

When two or more of the impellers A are placed on one shaft or in one vessel, they are joined together by the stays H, which give support and maintain concentricity of the inner ends of each.

The impellers A are preferably attached to open heads or drivers I, such as are shown in Figs. III and IV, and are provided on the exterior or interior, or both, with vanes J, that assist in setting the liquid in revolution within the containing vessel B.

The diameter of the impeller A can be more or less in proportion to that of the vessel B. The larger they are in proportion to the volume the sooner the liquid in the tanks B will be set in revolution and the more violent its agitation. The proportions as shown in the drawings give a good result.

The impellers A, I make hollow, so as to permit circulation through their interior, as well as around the outside, and thus increase admixture and agitation by counter-currents thus caused.

The operation is as follows: The vessel B, of any convenient form, is filled with liquid enough to cover the impellers A, but not full, and the shafts F and C are set in motion. The impellers A at first cause agitation of the liquid and then set it in revolution, so that the top of the liquid around the impeller by centrifugal force assumes a curved line, as indicated at L in Fig. I. Besides the general rotary motion of the liquid the difference in diameter and centrifugal effect between large and small ends of the impellers A cause an involute or inward rolling motion of the liquid, outward from the large ends and inward toward the small ends of the impellers, as indicated by arrows in Fig. I, these compound motions producing an effectual and

complete blending or admixture of two or more kinds of liquids at the point between the two impellers of each pair where the currents intermingle, as shown by the arrows on the several figures. In Fig. V, where the impellers are both set in the same relative position, the currents meet and intermingle between the two impellers as in the other figures, but in this case meet from opposite directions in the space between the two impellers, where the currents tend to pass each other, but produce a ring vortex in addition to the whirling motion caused by the revolution of the impellers on their axis, thus obtaining a very intimate admixture and blending of the liquids under treatment. By this device I can also effect the rapid reduction of soluble materials placed in the liquid and at the same time liberate any free gas contained therein. My invention is applicable to mixing and blending wines and liquors, oils, dyes, and the like, and in various processes in the manufacture of hydrates of all kinds.

It will be understood that the action of each of the conical impellers A is in a sense independent and at the same time coöperative, and the strata of involute or radial and inward flow caused by their tapering form can be repeated as many times as there are pairs of impellers placed in one vessel, and that the impellers can be set either way to taper upward or downward, the conical form being the essential feature.

It will also be understood that the purposes of the vanes J being tractile or to cause adherence between the impellers and the liquid they may be of any form or of any depth or

can be varied to suit fluids of different viscosity, those for thick fluids, such as paints or heavy oils, being much shallower than for limpid fluids.

Having thus described the nature and objects of my invention, what I claim is—

1. In a mixing and blending apparatus, a containing-tank, a revoluble shaft therein, with means for rotating the same, and two hollow conical impellers, borne on said shaft as on an axis, with a small interval, said impellers having spiral blades fixed upon the conical surfaces thereof, whereby by the rotation of said impellers the fluid in the tank is caused to circulate centrifugally from the narrower toward the wider openings of the cones and thence outward, meeting and blending in the space between the two cones, substantially as specified.

2. In a mixing and blending apparatus, a containing-tank, one or more pairs of revolving hollow cones on a revoluble shaft, with a small interval between each pair, and means for rotating the same, said cones having spiral blades on their surfaces, whereby the fluid is impelled from the narrower toward the wider ends of the said cones, meeting and blending in the space or interval between the same, substantially as specified.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

PATRICK F. DUNDON.

Witnesses:

JAMES L. KING,
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