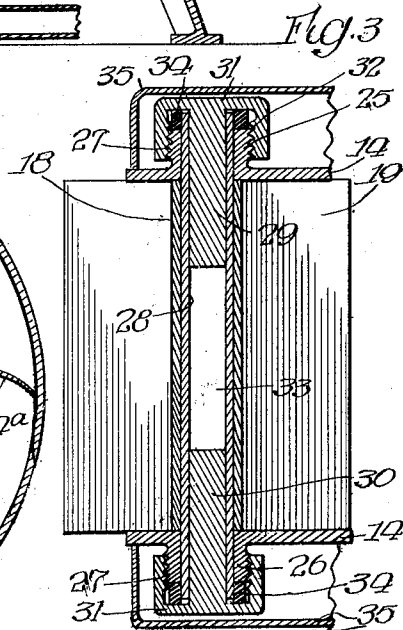
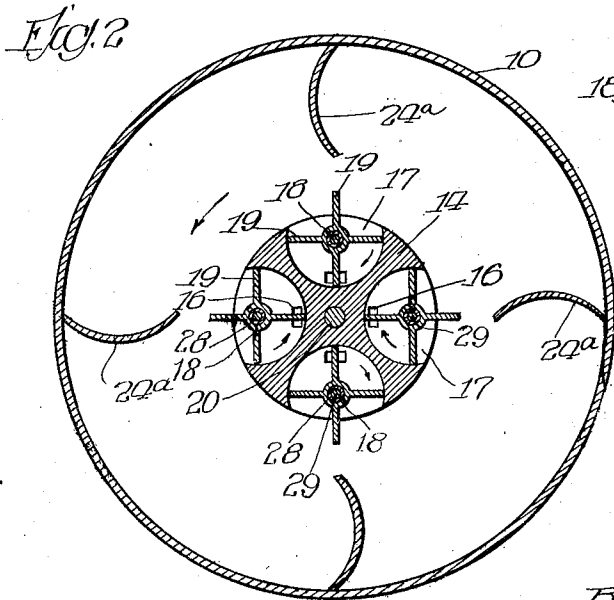
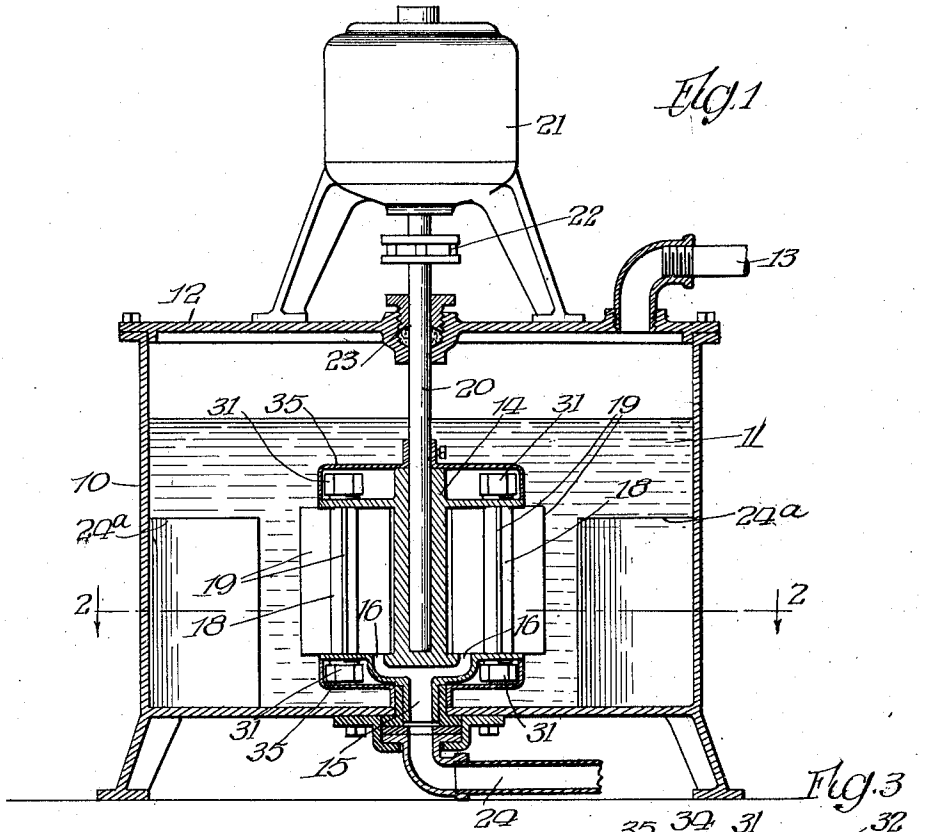


B. SKIDMORE, JR.
 HYDROTURBINE VACUUM PUMP.
 APPLICATION FILED MAR. 18, 1918.

1,361,189.

Patented Dec. 7, 1920
 4 SHEETS—SHEET 1.



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Fig. 4

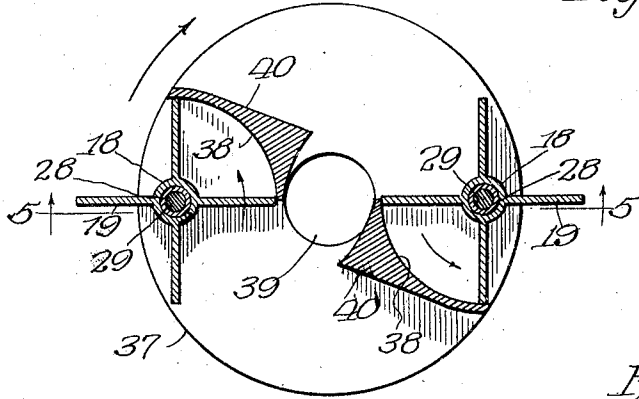


Fig. 5

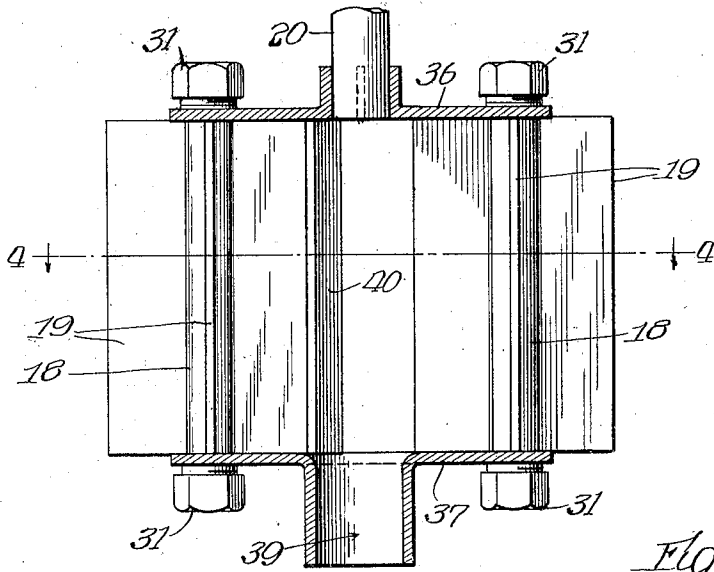
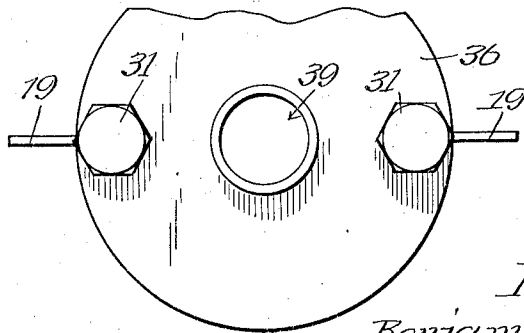


Fig. 6



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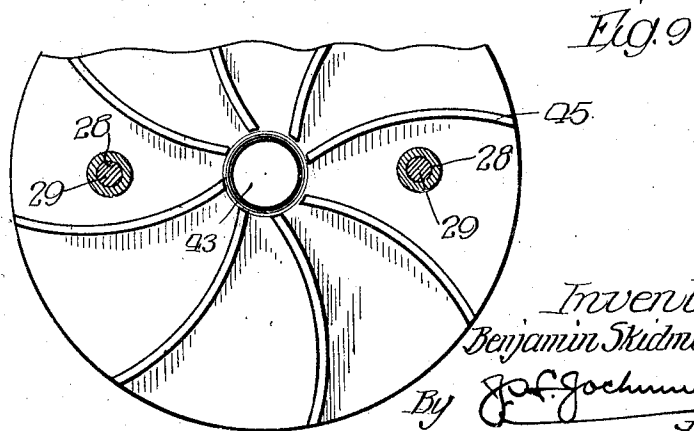
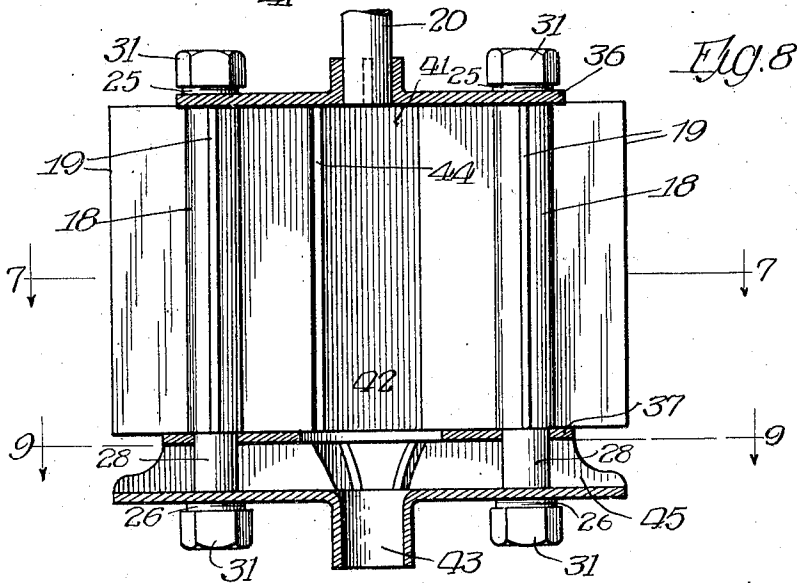
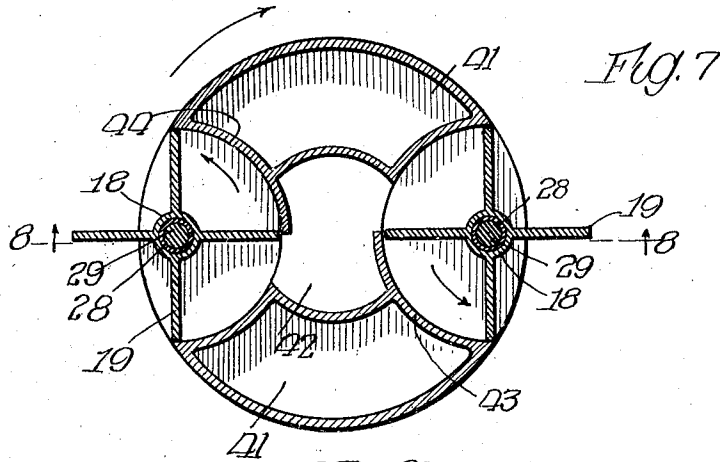
By *J. Gochman & Co.* Attorneys

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4 SHEETS—SHEET 3.



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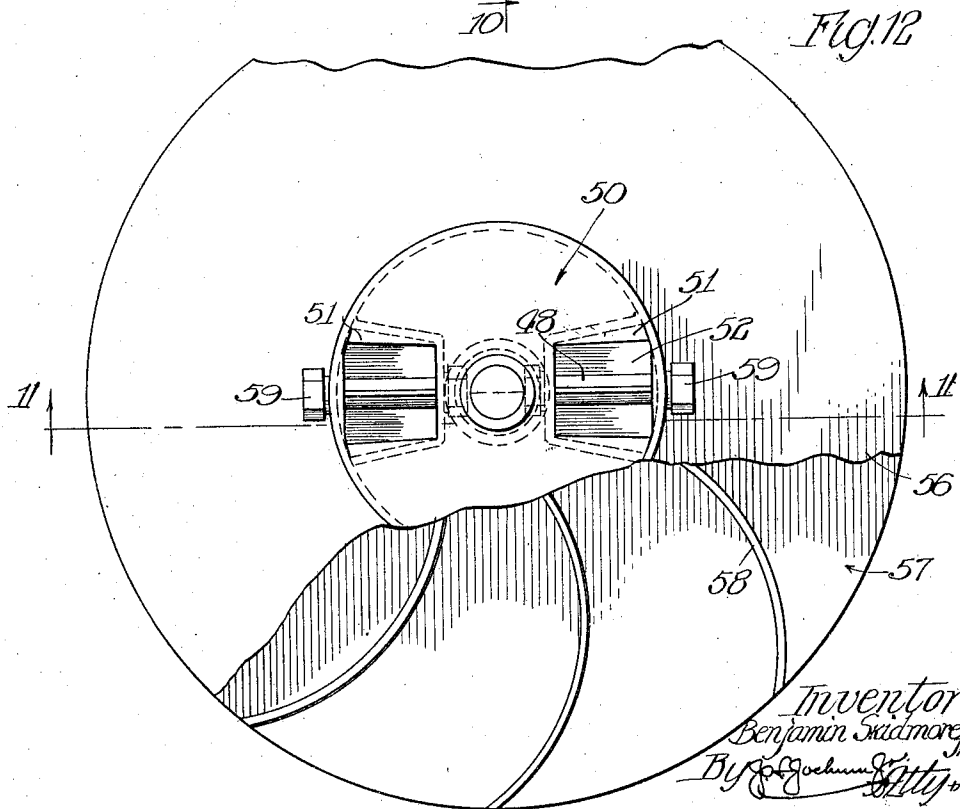
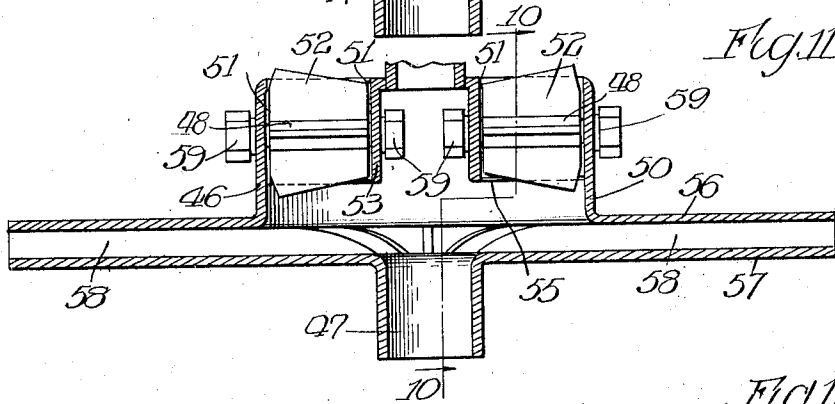
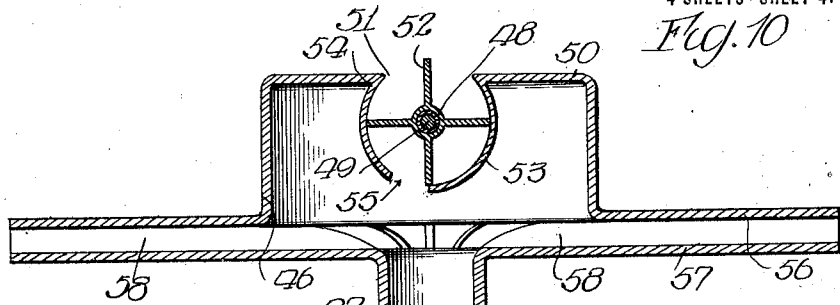
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1,361,189.

Patented Dec. 7, 1920.

4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

BENJAMIN SKIDMORE, JR., OF CHICAGO, ILLINOIS.

HYDROTURBINE VACUUM-PUMP.

1,361,189.

Specification of Letters Patent.

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Application filed March 18, 1918. Serial No. 223,073.

To all whom it may concern:

Be it known that I, BENJAMIN SKIDMORE, Jr., a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hydroturbine Vacuum-Pumps, of which the following is a specification.

This invention relates to improvements in hydroturbine vacuum pumps and one of the objects of the same is to provide an improved submerged pump of this character provided with means whereby a suction or partial vacuum will be produced in a chamber or passage by the actuation of the pump, and the fluid drawn from the chamber or passage will be trapped in predetermined quantities and delivered at intervals into the submerging liquid, the uncondensed fluid which passes through the liquid is conveyed to any desired point to be utilized in any suitable or desired manner.

A further object is to provide an improved submerged bearing for the parts whereby the operation of the various elements will not be interfered with.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention and in which:

Figure 1 is a view partly in vertical section and partly in side elevation of an improved apparatus of this character constructed in accordance with the principles of this invention.

Fig. 2 is a horizontal sectional view as taken on line 2—2, Fig. 1.

Fig. 3 is an enlarged vertical sectional view of one of the bearings for the rotary element.

Fig. 4 is a view similar to Fig. 2 of a modified form of the invention.

Fig. 5 is a sectional view taken on line 5—5, Fig. 4.

Fig. 6 is a top plan view of Fig. 5.

Fig. 7 is a horizontal sectional view on line 7—7, Fig. 8.

Fig. 8 is a vertical sectional view taken on line 8—8, Fig. 7.

Fig. 9 is a horizontal sectional view taken on line 9, 9, Fig. 8.

Fig. 10 is a sectional view on line 10—10, Fig. 11, of a modification.

Fig. 11 is a sectional view on line 11—11, Fig. 12.

Fig. 12 is a top plan view of Fig. 11 partly broken away.

Referring more particularly to the drawings, the numeral 10 designates a tank or receptacle adapted to contain liquid 11 and may be provided with a top or closure 12 through which an outlet 13 leads from the tank. Arranged within the tank and submerged within the liquid 11 is a rotary support, designated generally by the reference numeral 14 which may be of any desired size and configuration and is provided with a passage 15 leading therethrough, and with which passage a plurality of branches 16 have communication. This support in the form shown in Figs. 1 and 2, is preferably provided with peripheral chambers 17 through the bottoms of which the branches 16 lead. Rotatably supported within each of the chambers 17 is a rotary element 18, preferably comprising a plurality of wings or blades 19 and these wings or blades are adapted to pass over the respective openings 16 and to substantially extend across respective chambers 17. The blades are also of such a length that they will project beyond the periphery of the support 14.

The support 14 is given a rotary movement by means of a shaft 20 connected with a motor 21 through the medium of a flexible connection 22 and the shaft passes through a suitable bushing 23.

The passage 15 has communication with a pipe 24 within which latter it is desired to create a suction.

In operation the support 14 is given a rotary motion by the motor 21 and inasmuch as the support and the elements 18 are submerged, the latter being mounted to rotate freely upon the support, it will be manifest that as the support is rotated, the elements 18 will also be given a bodily rotation therewith and during the passage of the elements 18 through the liquid 11, an independent rotation will be imparted thereto with respect to the support 14. During the operation the liquid in the tank is prevented from entering between the blades 19 on account of centrifugal force due to the rotation of both the support 14 and the elements 18, and this rotation of the elements 18 will control the branches 16 of the passage 15 and will create

a suction in the passage 15. The fluid which is drawn into the pipe 24 and passage 15 will be discharged through the branch 16 and will be trapped between adjacent wings 19 of the elements 18 and the wall of the chamber 17, the latter cooperating with the wings for that purpose.

The fluid will be thus trapped and will be held in this condition until the element 18 is rotated so that the wings will pass out of cooperative relation with the wall of the chamber and the fluid which has heretofore been trapped will be discharged or delivered into the liquid 11 in the tank or receptacle

10. The uncondensed fluid will pass through the liquid 11 into the tank or receptacle 10 thereabove to be delivered through the pipe 13. Obviously if desired, the pipe 13 may be provided with a valve so that the fluid may be compressed.

In order to prevent the liquid 11 from rotating, due to the rotary motion of the support 14 and the elements 18, baffles 24^a may be provided within the tank or receptacle.

The elements 18 are provided with suitable bearings but in order to provide a bearing which may be submerged and at the same time will permit the elements 18 to freely rotate, there is provided spaced bearings 25, 26, each preferably being provided with a threaded periphery 27. The axle of the element 18 is tubular and projecting therethrough is a tubular member 28 which also extends into the bearings 25, 26. Trunnions 29, 30 are also provided and each of these trunnions is provided with a cap 31 of a diameter greater than the diameter of the bearing and is also provided with internal threads 32 adapted to engage the external threads of the respective bearings. The trunnions 29, 30 preferably terminate short of each other to form a space 33 therebetween and which space may serve as a lubricant space. The ends of the tubular element 28 extend beyond the bearings 25, 26 and disposed between the respective bearings and the respective caps 31 of the trunnions is a packing 34 to form a fluid tight joint.

A cover 35 may also be provided for covering the projecting bearings and caps so that they will not form obstructions to create friction as the support 14 is rotated through the liquid.

In the form of the invention shown in Figs. 4 and 5, the support preferably comprises spaced plates or members 36, 37 between which the elements 18 rotate, and arranged adjacent each of the elements 18 and between the members 36, 37 is an upright wall 38 with which the ends of the wings 19 cooperate to trap the fluid which is drawn through the opening 39 of the support.

These walls 38 terminate short of each other and arranged adjacent the walls and

also between the members 36, 37 are impellers 40 which serve as a means for impelling or throwing the liquid by means of centrifugal force from between the members 36, 37. In this form of the invention it will be manifest that as the elements 18 rotate and as the fluid is drawn through the opening 39, the fluid will be trapped between adjacent wings 19 and the cooperating wall 38 and will remain trapped until the wings 19 pass out of cooperative relation with the wall 38 when the fluid will be discharged into the submerging liquid as in the form shown in Fig. 1.

In the form of the invention shown in Figs. 7 to 9 the support preferably comprises spaced upright portions 41 which may be either solid or of a hollow construction, so as to form a passage 42 which communicates with the passage 43 and through which latter the fluid is drawn. The wings 19 of the rotary elements 18 cooperate with the walls 43, 44 in the manner similar to that described in connection with Fig. 4, and as the fluid is drawn through the opening 42 by the rotation of the support and the elements 18 with respect thereto, the fluid will be trapped between the adjacent wings 19 of the element 18 and the respective walls 43, 44 until it is delivered into the submerging liquid 11.

In the event that any of the submerging liquid should find its way into the passage 42 it will gravitate toward the bottom of the support at which point it will be caught by radial ribs or wings 45 and will be thrown outwardly by centrifugal force to be discharged from the support.

With this improved construction it will be manifest that a very powerful pump will be produced and a suction will be created through a pipe or passage to deliver the fluid therethrough into the submerging liquid and the uncondensed fluid will pass through the liquid to the top thereof and can be either conveyed to a point of use or compressed as may be desired.

Obviously any number of rotary elements 18 may be provided and these elements may be provided with any desired number of wings 19.

In the form of invention shown in Figs. 10 to 12, a rotary support is provided with a chamber 46 with which the inlet passage 47 has communication and the rotary elements 48 are mounted to rotate about horizontal axes 49. The top wall 50 of the chamber 46 is provided with suitable openings 51 in which the elements 48 rotate and the elements are so mounted with respect to the wall 50 that the wings 52 of the elements will operate in the opening and at the same time the edges of the wings are adapted to project beyond the top 50 of the chamber.

Any number of these elements 48 may be

provided and are preferably of a frusto conical shape so as to facilitate their free rotation with respect to the support when the latter is rotated. Projecting from the top 50 and into the chamber 46 is a wall 53 which extends partially around one portion of the element 48 and on one side of the opening 51 in the top. Another wall 54 also projects from the top 50 into the chamber 46 and surrounds another portion of the element 48. These walls 53, 54 terminate short of each other within the chamber 46 to form an opening 55, and through which opening fluid which is drawn into the inlet 47 is adapted to pass between adjacent wings 52 of the element so that when the element is rotated the fluid will be trapped between the adjacent wings and the wall 53, and which trapped fluid will be delivered through the opening 51 in the top of the chamber as the element 48 rotates.

Arranged below the chamber 46 and between spaced members or walls 56, 57 are a plurality of radially disposed wings or blades 58 so that in the event of any liquid passing into the chamber 46 through the opening 51 in the top thereof, this liquid will be thrown out by centrifugal force between the members 56, 57 by means of the wings or blades 58.

Bearings 59 similar to the bearings shown in Fig. 3 may be provided, if desired.

While the preferred forms of the invention have been herein shown and described and the supports with the elements mounted thereon to freely rotate by the rotation of the support in the submerging liquid, and the submerging liquid is held against rotation, it is of course to be understood that this operation can be reversed, that is, the support and elements may be fixed while the submerging liquid itself is given a rotary movement about the support.

What is claimed as new is:

1. A device of the character described embodying a submerged support having a fluid passage therethrough, a rotary element carried by the support and adapted to control the said passage, and means whereby the said support and the submerging liquid may be rotated relatively one with relation to the other for rotating the said element relatively to the support, whereby said element will operate to deliver predetermined quantities of fluid from the said passage into the said liquid.

2. A device of the character described embodying a submerged support having a fluid passage therethrough, a rotary element carried by the support and adapted to control the said passage, and means whereby the said support and the submerging liquid may be rotated relatively one with relation to the other for rotating the said element relatively to the support, whereby said ele-

ment will operate to deliver predetermined quantities of fluid from the said passage into the said liquid, the said element being mounted for free rotation by the action of the submerging liquid thereon. 70

3. A device of the character described embodying a submerged rotary support having a fluid passage therethrough, an element mounted upon the support for rotation therewith and for free rotation with respect thereto, when the support is rotated, and means whereby said element will cause a suction through the said passage and will operate to deliver the fluid drawn through the passage, into the submerging liquid. 80

4. A device of the character described embodying a submerged rotary support having a fluid passage therethrough, an element mounted upon the support for rotation therewith and for free rotation with respect thereto, when the support is rotated, and means whereby said element will cause a suction through the said passage, and will operate to deliver at intervals predetermined quantities of the fluid drawn through the passage, into the submerging liquid. 90

5. A device of the character described embodying a submerged rotatable support having a fluid passage therethrough, an element adjacent the passage, said element being mounted for rotation with the support and with respect thereto, means for rotating the support to cause the element to be freely rotated with respect to the support during its passage through the liquid, to create a suction through the said passage and means cooperating with the element whereby predetermined quantities of the fluid will be trapped by the said element and delivered into the submerging liquid. 105

6. A device of the character described embodying a submerged rotary support having a fluid passage therethrough, an element adjacent the passage and mounted upon the support for rotation therewith and for free rotation with respect thereto, means for rotating the support whereby the said element will be independently rotated during its passage through the liquid, and whereby a suction will be created through the said passage, and means with which the said element cooperates for trapping the fluid drawn through the passage in predetermined quantities and delivering the same into the submerging liquid. 120

7. A device of the character described embodying a submerged rotary support having a fluid passage therethrough, an element adjacent the passage and mounted upon the support for rotation therewith and for free rotation with respect thereto, means for rotating the support whereby the said element will be independently rotated during its passage through the liquid and whereby a suction will be created through the said 130

passage, means with which the said element coöperates for trapping the fluid drawn through the passage in predetermined quantities and delivering the same into the submerging liquid, and means for maintaining the submerging liquid against rotation.

8. A device of the character described embodying a submerged rotary support having a fluid passage therethrough, an element embodying a plurality of spaced wings mounted upon the support for rotation therewith and with respect thereto, means for rotating the support whereby the said element will be freely rotated with respect to the support during its bodily movement through the submerging liquid and whereby a suction will be created through the said passage, and a wall on the support adapted to temporarily close the space between adjacent wings of the said element to trap a predetermined quantity of the fluid drawn through the passage, said element also operating to deliver the trapped fluid into the submerging liquid.

9. A device of the character described embodying a support, said support embodying spaced submerged members, one or more elements mounted between the said members for bodily rotation therewith and also for rotation with respect thereto, said elements being freely rotatable during their bodily movements through the submerging liquid by the action of the latter thereon, there being a suction passage having communication with the space between the said members and adjacent which passage the elements are located, means for rotating the said support whereby the said elements will be freely rotated and a suction will be created in the passage, and provisions whereby the said elements will during their independent rotation trap predetermined quantities of the fluid drawn through the said passage and deliver the same into the submerging liquid.

10. A device of the character described embodying a support, said support embodying spaced submerged members, one or more elements mounted between the said members for bodily rotation therewith and also for rotation with respect thereto, said elements being freely rotatable during their bodily movement through the submerging liquid by the action of the latter thereon, there being a suction passage having communication with the space between the said members and adjacent which passage the elements are located, means for rotating the said support whereby the said elements will be freely rotated and a suction will be created in the passage, provisions whereby the said elements will during their independent rotation trap predetermined quantities of the fluid drawn through the said passage and deliver the same into the submerging liquid.

uid, and means for maintaining the submerging liquid against rotation during the rotation of the said support.

11. A device of the character described embodying a support, said support embodying spaced submerged members, one or more elements mounted between the said members for bodily rotation therewith and also for rotation with respect thereto, said elements being freely rotatable during their bodily movement through the submerging liquid by the action of the latter thereon, there being a suction passage having communication with the space between the said members and adjacent which passage the elements are located, means for rotating the said support whereby the said elements will be freely rotated and a suction will be created in the passage, provisions whereby the said elements will during their independent rotation trap predetermined quantities of the liquid drawn through the said passage and deliver the same into the submerging liquid, and impeller elements disposed between the said spaced members whereby the liquid will be thrown out by centrifugal force from between the said members.

12. A device of the character described embodying a support, said support embodying spaced submerged members, one or more elements mounted between the said members for bodily rotation therewith and also for rotation with respect thereto, said elements being freely rotatable during their bodily movement through the submerging liquid by the action of the latter thereon, there being a suction passage having communication with the space between the said members and adjacent which passage the elements are located, means for rotating the said support whereby the said elements will be freely rotated and a suction will be created in the passage, provisions whereby the said elements will during their independent rotation trap predetermined quantities of the fluid drawn through the said passage and deliver the same into the submerging liquid, and means below the said elements whereby the liquid entering between the said members will be thrown out by centrifugal force.

13. A device of the character described embodying a support, said support embodying spaced submerged members, one or more elements mounted between the said members for bodily rotation therewith and also for rotation with respect thereto, said elements being freely rotatable during their bodily movement through the submerging liquid by the action of the latter thereon, there being a suction passage having communication with the space between the said members and adjacent which passage the elements are located, means for rotating the said support whereby the said elements will

be freely rotated and a suction will be created in the passage, provisions whereby the said elements will during their independent rotation trap predetermined quantities of the fluid drawn through the said passage and deliver the same into the submerging liquid, and means below the said elements whereby the liquid entering between the said members will be thrown out by centrifugal force, the last recited means embodying radial blades extending beneath the said elements.

14. A device of the character described embodying a submerged support having a fluid passage therethrough, a rotary element carried by the support and adapted to control the said passage, and means whereby the said support and the submerging liquid may be rotated relatively one with relation to the other for rotating the said element relatively to the support, whereby said element will operate to deliver predetermined quantities of fluid from the said passage into the said liquid, the said element being mounted for independent rotation on an axis transverse to the axis of rotation of the said support.

15. A device of the character described embodying a submerged rotary support having a fluid passage therethrough, an element mounted upon the support for rotation therewith and for free rotation with respect thereto, when the support is rotated, and means whereby said element will cause a suction through the said passage and will operate to deliver the fluid drawn through the passage, into the submerging liquid, the said element being mounted for independent rotation on an axis transverse to the axis of rotation of the said support.

16. A device of the character described embodying a submerged rotary support having a fluid passage therethrough, an element adjacent the passage and mounted upon the support for rotation therewith and for free rotation with respect thereto, means for rotating the support whereby the said element will be independently rotated during its passage through the liquid and whereby a suction will be created through the said passage, means with which the said element cooperates for trapping the fluid drawn through the passage in predetermined quantities and delivering the same into the submerging liquid, and means for maintaining the submerging liquid against

rotation, the said element being mounted for independent rotation on an axis transverse to the axis of rotation of the said support.

17. A device of the character described embodying a submerged rotary support having a fluid passage therethrough, an element embodying a plurality of spaced wings mounted upon the support for rotation therewith and with respect thereto, means for rotating the support whereby the said element will be freely rotated with respect to the support during its bodily movement through the submerging liquid and whereby a suction will be created through the said passage, and a wall on the support adapted to temporarily close the space between adjacent wings of the said element to trap a predetermined quantity of the fluid drawn through the passage, said element also operating to deliver the trapped fluid into the submerging liquid, the said element being mounted for independent rotation about a horizontal axis.

18. A device of the character described embodying a support, said support embodying spaced submerged members, one or more elements mounted between the said members for bodily rotation therewith and also for rotation with respect thereto, said elements being freely rotatable during their bodily movement through the submerging liquid by the action of the latter thereon, there being a suction passage having communication with the space between the said members and adjacent which passage the elements are located, means for rotating the said support whereby the said elements will be freely rotated and a suction will be created in the passage, provisions whereby the said elements will during their independent rotation trap predetermined quantities of the fluid drawn through the said passage and deliver the same into the submerging liquid, and means below the said elements whereby the liquid entering between the said members will be thrown out by centrifugal force, the said elements being mounted for independent rotation with respect to the support on axes transverse to the axis of rotation of the support.

In testimony whereof I have signed my name to this specification, on this 9th day of March, A. D. 1918.

BENJAMIN SKIDMORE, JR.