(No Model.)

J. SCHNEIBLE.

ASPIRATOR.

No. 571,692. Patented Nov. 17, 1896.

Fig. 1.

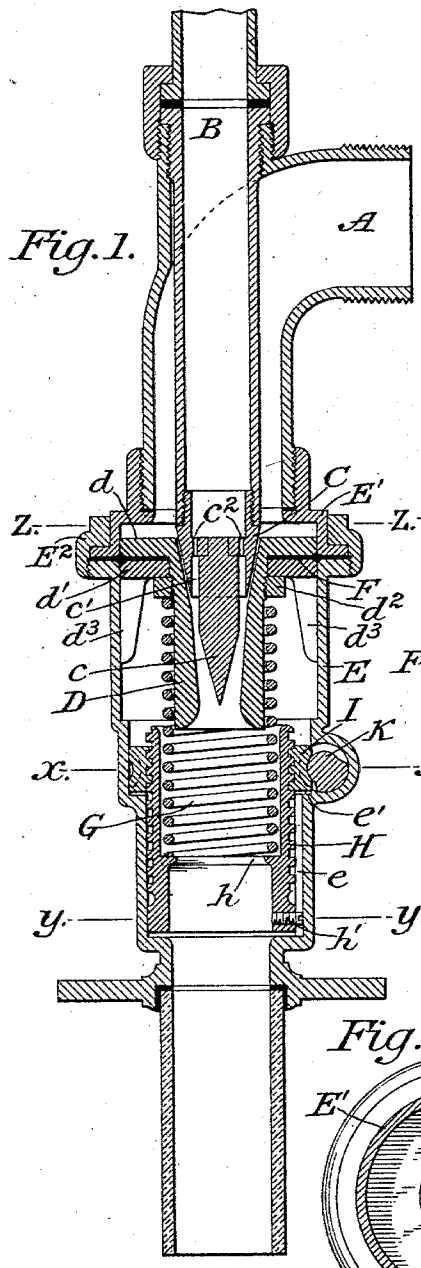


Fig. 2.

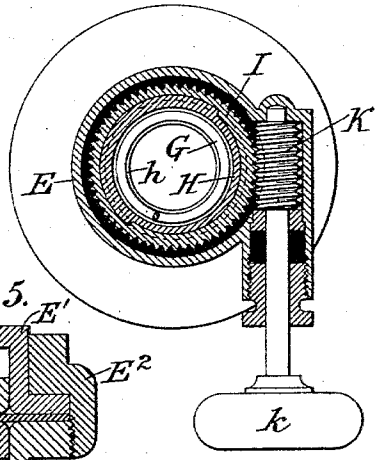


Fig. 5.

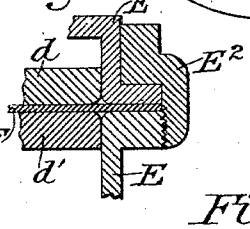


Fig. 3.

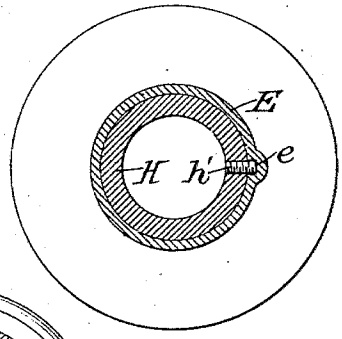
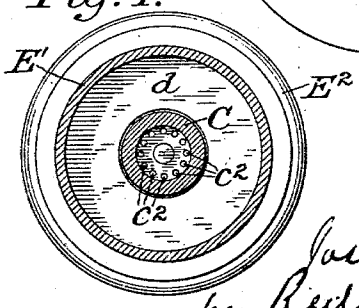


Fig. 4.



Attest:
A. K. Jesbera.
Robert Irish

Inventor:
Joseph Schneible
by Redding & Kiddle
Attys.

UNITED STATES PATENT OFFICE.

JOSEPH SCHNEIBLE, OF NEW YORK, N. Y.

ASPIRATOR.

SPECIFICATION forming part of Letters Patent No. 571,692, dated November 17, 1896.

Application filed August 27, 1895. Serial No. 560,633. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH SCHNEIBLE, a citizen of the United States, and a resident of the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Aspirators, &c., of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to devices of the general character of those which are commonly known as "aspirators" or "jet-pumps," and by means of which one fluid supplied under suitable pressure or head is made to set up and maintain the flow of another fluid for the purpose of producing a partial vacuum or of creating a blast.

Another or additional function of such devices, as sometimes used, is to effect a thorough mixture of the two fluids, and it is this additional function which is particularly in view in the present invention, although the improvements hereinafter described possess material advantages even when such additional function is not sought.

The object of the invention is to produce a device of the general character referred to which shall be capable of easy and exact adjustment according to the requirements of its use, and, furthermore, shall be automatic or self-regulating in its action, so that variations in the supply of the fluid shall produce a corresponding change in the action of the device, with the result that the operation of the device shall be constant and uniform. Where, as in the particular use referred to, the mixture of two fluids is desired to be accomplished, the special utility of the present improvements will be clearly apparent, for not only can the improved device be adjusted to determine the relative proportions of the two fluids to be mixed, but when such proportions have been determined any variation in the supply of the one fluid will produce a corresponding variation in the supply of the other and substantially absolute uniformity in the character of the mixture will be secured. Particularly desirable is such a result when a given liquid is to have combined with it a certain proportion of gas, as in the charging of beer and other liquids with carbon dioxid.

The structural features in which the invention more particularly consists are fully explained hereinafter with reference to the accompanying drawings, in which they are represented in an approved form as embodied in a complete device which for convenience may be called an "aspirator."

In the drawings, Figure 1 is a vertical central section through an aspirator embodying the improvements. Fig. 2 is a horizontal section on the line $x\ x$ of Fig. 1. Fig. 3 is a horizontal section on the line $y\ y$ of Fig. 1. Fig. 4 is a horizontal section on the line $z\ z$ of Fig. 1; and Fig. 5 is a detail section, on an enlarged scale, of a portion of the structure.

The connection for the fluid which is supplied under pressure from any suitable source to operate the aspirator is shown at A, and that for the fluid to be acted upon at B. The latter connection terminates in a tapering nozzle C, having a solid core c, in the wall of which or around which is formed an annular aperture c', which communicates with the interior of the pipe B through suitable holes $c^2\ c^2$. Around the extremity of the pipe B or the nozzle just described is placed a sleeve D, which for a portion of its length substantially conforms interiorly to the taper of the nozzle. This sleeve D is supported within a chamber formed by a shell or casing E by a diaphragm or yielding piston or packing F, which will permit a limited longitudinal movement of the sleeve in either direction.

The support for the sleeve D is preferably made as a composite piston-diaphragm, combining in itself certain of the characteristics of a flexible diaphragm and of a piston. To this end the sleeve is made with a flange d, which has a snug sliding fit in the chamber formed by the upper part E′ of the shell or casing. A thin flexible plate or ring F, of rubber, leather, or other suitable material, is clamped tightly between the flange d and a ring d', which may also have a snug sliding fit in the lower part E of the shell or casing and may be held in place by a ring d', screwed upon the body of the sleeve D.

The ring d' may be provided with bearing-pieces $d^3\ d^3$ to guard against the possibility of binding of the piston in its chamber. It is not essential that both the ring d' and the flange shall have a piston fit within the chamber, although the construction shown is pre-

ferred, as it better protects and supports the flexible diaphragm and effectually prevents any rupture or unequal stretching thereof by fluid which might escape around one piston against the adjacent side of the diaphragm. The outer edge of the diaphram F is tightly clamped between the parts E and E′ of the shell or casing, the two parts being secured together by any suitable means, as by a clamping-ring E^2. Assuming that the supporting-diaphragm alone would maintain the sleeve D normally in the position shown in Fig. 1, it will be understood that any relative increase of pressure upon the under side thereof would raise the sleeve and reduce or shut off entirely the flow of liquid through the annular space between the sleeve and the nozzle C, thereby reducing the power of the aspirator, while any relative increase of pressure in excess of the normal on the upper side of the diaphragm would depress the sleeve, increase the area of the annular space between it and the nozzle, and consequently increase the flow of the impelling fluid and the power of the aspirator.

In order that the sleeve D may normally rise to stop the flow when the pressure on the under side of the diaphragm relative to that on the upper side increases above the normal, the diaphragm is raised normally by a spring G, which is conveniently supported in the lower part of the shell E. Furthermore, in order that the normal tendency of the diaphragm to rise may be increased more or less, so that the aspirator shall open or close at a given pressure, means are provided for adjusting the spring G. As represented in the drawings, the spring G rests upon a shoulder *h* of a sleeve H, which is adjustable vertically in the shell E. The sleeve is held from turning by the engagement of a pin *h′* with a vertical groove *e* in the wall of the shell E. The sleeve is screw-threaded exteriorly and engaged by an annular nut I, which rests upon a shoulder *e′* of the shell E, and, being suitably toothed, is engaged by a tangent screw K. The latter is mounted in suitable bearings in the shell E and is provided with a head or handle *k*, whereby the desired adjustment of the sleeve H and spring G may be effected. Any other suitable or convenient means for effecting the desired adjustment might be substituted for those described.

It will now be understood that with the aspirator operating under normal conditions an increase of pressure on the liquid supplied through the pipe A and a consequent increase in the quantity of liquid passed through the aspirator will be accompanied by an increase of the power of the aspirator and a corresponding increase in the quantity of gas or other fluid drawn in to be mingled with the liquid. Should the pressure on the liquid supplied through the pipe A fall below the normal, the power of the aspirator will be reduced correspondingly; also if the pressure on the under side of the diaphragm be increased relatively by a reduction or complete stopping of the delivery from the apparatus, the diaphragm will rise and raise with it the sleeve D, thereby reducing or stopping entirely the flow of liquid from the pipe A around the nozzle C. As the power of the aspirator is reduced to zero the flow of gas through the pipe B and nozzle C will also cease. In other words, if under the conditions of operation a certain difference is required to be maintained between the pressure on the liquid as it reaches the aspirator and the pressure on the liquid after it has passed the aspirator, that pressure difference will be maintained automatically regardless of variations in the quantity of liquid flowing through the aspirator, while the quantity of gas drawn in and mingled with the liquid varies with the quantity of the liquid.

While the aspirator is shown as connected to a pipe it will be readily understood that it might be applied directly to the bottom or other wall of the vessel containing the liquid. Likewise, connection might be made directly to a vessel containing or supplying the gas. Various other changes in the form and arrangement of the device might also be made without departing from the spirit of the invention.

For convenience that part which supports the movable portion of the aspirator and is itself adapted to yield with varying pressure is termed in certain of the claims a "piston," but it will be understood that the word is used as a generic term for all devices which possess the functions ascribed in the specification to the part referred to.

I claim as my invention—

1. In a device of the character described, the combination of means to supply the operating fluid, means to supply the fluid operated upon, a sleeve and nozzle constituting the parts of an aspirator, one of said parts being movable with respect to the other, and a flexible plate to support said movable part and adapted to yield with varying pressure thereon.

2. In a device of the character described, the combination with an aspirator, of a piston adapted to yield with the varying fluid-pressure thereon, means controlled by said piston to vary the flow of liquid through the aspirator and means to apply pressure to vary the resistance of said piston to the fluid-pressure thereon.

3. In a device of the character described, the combination with a shell or casing, means to supply one fluid thereto, and a nozzle to which the other fluid is supplied, of a sleeve surrounding said nozzle and a flexible plate secured to said shell and supporting said sleeve.

4. In a device of the character described, the combination with a shell or casing, means to supply one fluid thereto, and a nozzle to which the other fluid is supplied, of a sleeve surrounding said nozzle and adapted to move

in said shell, and a spring to support said sleeve.

5. In a device of the character described, the combination with means to supply the operating fluid, means to supply the fluid operated upon, of a sleeve and nozzle constituting the parts of an aspirator, one of said parts being movable with respect to the other, a piston adapted to yield with the varying pressure thereon and having said movable part connected thereto, and an adjustable spring to support said piston.

This specification signed and witnessed this 24th day of August, A. D. 1895.

JOSEPH SCHNEIBLE.

In presence of—

ALFR. W. KIDDLE,

W. B. GREELEY.