

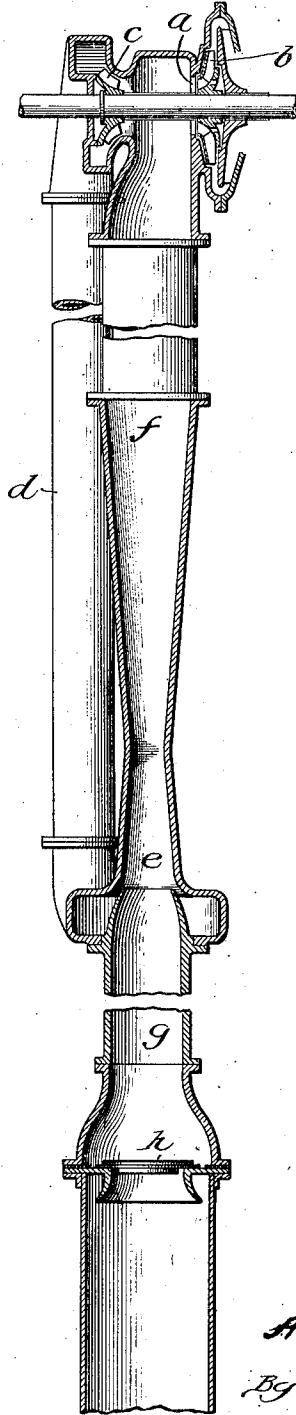
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MEANS FOR INCREASING THE HEIGHT OF SUCTION OF PUMPS.

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1,038,201.

Patented Sept. 10, 1912.



Witnesses:

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UNITED STATES PATENT OFFICE.

AUGUSTE CAMILLE EDMOND RATEAU, OF PARIS, FRANCE.

MEANS FOR INCREASING THE HEIGHT OF SUCTION OF PUMPS.

1,038,201.

Specification of Letters Patent. Patented Sept. 10, 1912.

Application filed August 9, 1909, Serial No. 511,874. Renewed June 18, 1912. Serial No. 704,469.

To all whom it may concern:

Be it known that I, AUGUSTE CAMILLE EDMOND RATEAU, citizen of France, residing at Paris, France, have invented a certain new and useful Improvement in Means for Increasing the Height of Suction of Pumps, of which the following is a full, clear, concise, and exact description.

My invention relates to means for increasing the height of suction of pumps and more particularly of centrifugal pumps.

It is known that in the case of centrifugal pumps, the liquid in consequence of its great velocity in the intake has difficulty in following the vanes, and in order that separation of the streams of fluid should not be produced, it is necessary that a certain absolute pressure should be maintained at the intake. This pressure should be the greater when the speed of rotation of the vanes is greater. From this there results a certain inadaptability of high speed centrifugal pumps to give a height of suction in the neighborhood of that which corresponds to atmospheric pressure.

With the view of augmenting the height of suction of pumps my invention consists in shunting off a portion of the fluid before its entrance in the intake of the main pump and discharging it, under a given pressure, in a jet apparatus arranged in the suction pipe in such a manner as to produce an entrainment of the fluid which is sucked in, and thus increasing the pressure of the fluid at the point of injection.

The accompanying drawing represents, by way of example, one form of arrangement for the realization of the invention.

Before the intake *a* of a centrifugal wheel *b* or of the usual group of such wheels, is placed a helicoidal wheel *c* of which the discharge passage or pipe *d* ends in an injector *e*, which is placed at a given point on the suction pipe *fg*. Said suction pipe is provided as usual with a foot valve *h*. This arrangement operates in the following manner. The pipe *fg* and the pump *b* are filled with water and the helicoidal wheel *c* is put in operation. The valve *h* then opens, even if the height of the suction column is greater than ten meters. The helicoidal wheel *c* takes a portion of the liquid before its entrance to the intake of the pump *b* and discharges it in the shunt-pipe *d*. This portion of the liquid which is shunted off passes to the annular space of the injector *e*, while

the liquid coming from the lower part *g* of the suction pipe passes to the interior of the nozzle of the injector. The liquid coming from the pipe *d* tends to induce the entrainment of the liquid coming from the pipe *g*, so that the pressure of the liquid sucked up is raised in the part *f* of the suction pipe at the discharge of the injector. If, for example, the pipe *d* has a section equal to that of the pipe *g* and in consequence the section of the pipe *f* is twice such section, in giving to the liquid in *d* a pressure *H*, experience shows that the injector will raise the pressure of the liquid sucked up by about $\frac{1}{2} H$. In the case of water in particular, if the total height of the column *fg* is 10 meters, the result is as if this height was reduced to $10 - \frac{H}{3}$ and the pumping apparatus can thus operate on suctions which even exceed 10 meters.

In place of having the motive liquid discharged in the annular space of the injector *e* and the entrained liquid in the nozzle, it is evident that the arrangement could be reversed without changing the mode of operation of the apparatus.

In practice, the pump *b* and the helicoidal wheel *c* are mounted with advantage on the same shaft in such a manner as to be driven by the same motor.

Any kind of a wheel, centrifugal, helicocentrifugal or a group of these wheels, can be substituted for the helicoidal wheel *c*, as is evident. The process is equally applicable if the centrifugal pump *b* be replaced by a pump of any nature.

The invention finds special application in the pumping out of mines and in all installations or works in which it is often necessary to suck liquids at a great depth.

I claim:

1. In an apparatus for increasing the height of suction of pumps, the combination with a pump, of a suction pipe having an injector arranged therein, a shunt pipe extending from the upper portion of said suction pipe to said injector, and means for forcing a portion of the fluid, before its entrance to said pump, under pressure through said shunt pipe.

2. In an apparatus for increasing the height of suction of pumps, the combination with a pump, of a suction pipe having an injector arranged therein, a shunt pipe extending from the upper portion of said suc-

tion pipe to said injector, and a wheel for discharging a portion of the fluid, before its entrance to said pump, under pressure through said shunt pipe.

5 3. In an apparatus for increasing the height of suction of pumps, the combination with a pump, of a suction pipe having an injector arranged therein, a shunt pipe extending from the upper portion of said pipe to
10 said injector, and a helicoidal wheel arranged in said shunt pipe for discharging a portion of the fluid under pressure into said shunt pipe.

15 4. In an apparatus for increasing the height of suction of pumps, the combination

with a pump, of a suction pipe having an injector arranged therein, a shunt pipe extending from the upper portion of said suction pipe to said injector, a wheel for discharging a portion of the fluid, before its
20 entrance to said pump, under pressure through said shunt pipe, and a shaft upon which both said pump and said wheel are mounted.

In witness whereof, I hereunto subscribe
my name this 26th day of June A. D., 1909. 25

AUGUSTE CAMILLE EDMOND RATEAU.

Witnesses:

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ALBERT NUNÈS.