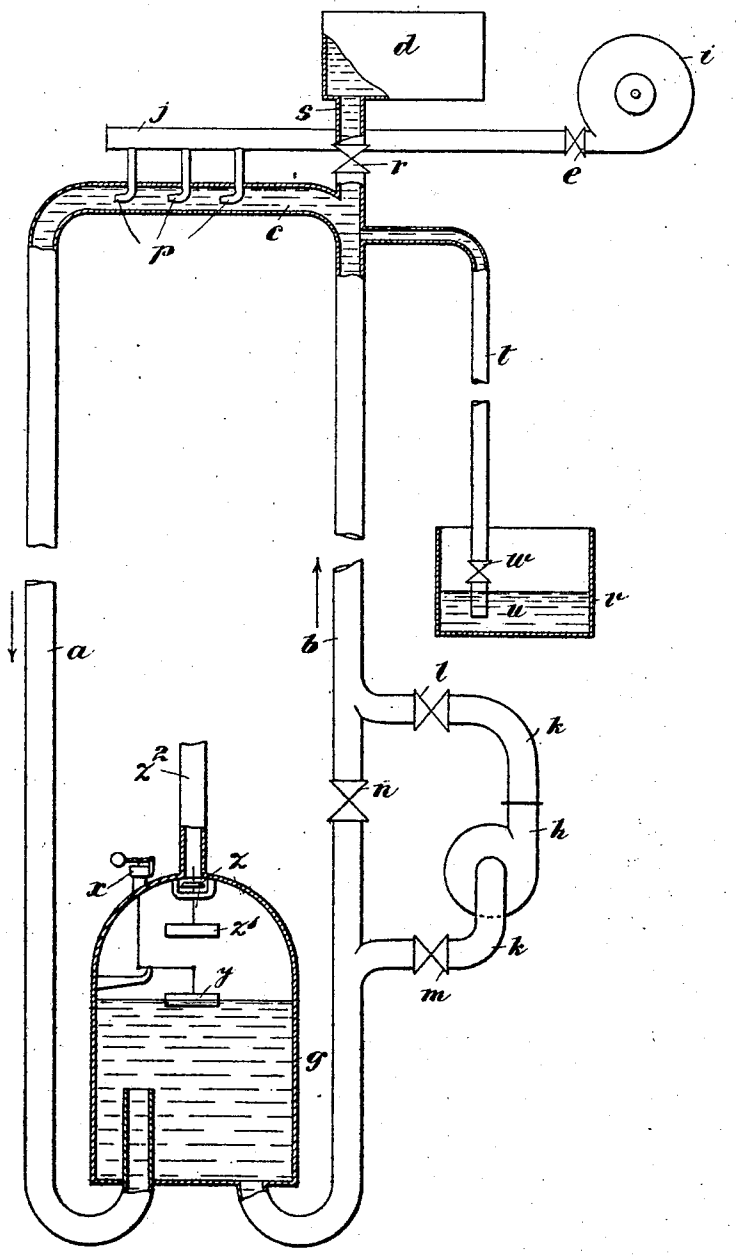
No. 859,213. PATENTED JULY 9, 1907.

J. GILL.

APPARATUS FOR COMPRESSING AIR OR OTHER ELASTIC FLUID FOR THE PRODUCTION OF MOTIVE POWER.

APPLICATION FILED APR. 10, 1906.



Witnesses.

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APPARATUS FOR COMPRESSING AIR OR OTHER ELASTIC FLUID FOR THE PRODUCTION OF MOTIVE POWER.

No. 859,213. Specification of Letters Patent. Patented July 9, 1907.

Application filed April 10, 1906. Serial No. 310,977.

To all whom it may concern:

Be it known that I, JOHN GILL, a subject of the King of Great Britain, residing at Edinburgh, Scotland, have invented new and useful Improved Apparatus for Compressing Air or other Elastic Fluid for the Production of Motive Power and other Purposes, of which the following is a specification.

This invention relates to that kind of apparatus for compressing air or other elastic fluid described in the specification of an application for a patent in the United States of America filed by me on the 3rd June 1905 Serial Number 263676, and which consists of two more or less vertically arranged pipes connected together at the top by a pipe and to an air receiver at the bottom in such manner that water or other incompressible liquid may be circulated continuously through them, the air to be compressed being introduced into the top of one of the pipes (called the downward pipe) and carried down along with the liquid therein to the bottom thereof where it is delivered, in a compressed condition, into an air receiver while the liquid which has carried it down and compressed it passes into and rises in the other pipe (called the upward pipe) to return to the top of the downward pipe and continue the circulation of liquid and compression of air.

The accompanying drawing is a diagrammatic sectional elevation of such an apparatus constructed in accordance with my present invention.

a is the downward pipe, *b* the upward pipe, *c* the pipe connecting these two pipes together at the top, *d* the reservoir for receiving liquid displaced by the air which is being carried down the pipe *a*, *g* is the air receiver to which the lower ends of the pipes *a* and *b* are connected, *h* is the pump for effecting the circulation of the liquid in the pipes *a* and *b*, and *i* is the blower or other suitable air-compressing device for delivering air into the upper end of the downward pipe *a*. All these parts are present in the apparatus described in the aforesaid specification of the application Serial No. 263676.

My present improvements consist as follows:—In cases where the circulation of the liquid through the pipes *a b* and *c* is effected by a pump or other similar mechanical means I place the said pump *h*, for example, in a by-pass *k* of the main pipe *b*, and provide suitable valves *l*, *m*, *n* which enable the pump to be shut off from the pipe *b* when the apparatus has been duly started and it is desired to continue its action by means of compressed air as hereinafter described instead of by the pump. That is to say when the pump is to be used for effecting the circulation the valves *l* and *m* are opened and the valve *n* closed; but when the pump is to be put out of use and the circulation of liquid in the pipes *a*, *b* is to be continued by means of the compressed air supplied by the blower *i*, or from some other source such as the receiver *g* for example, the valves *l* and *m* are closed and the valve *n* opened.

I introduce the air to be compressed by the apparatus into the downward pipe *a* through a number of jets or nozzles *p*, preferably opening into the pipe *c* connecting the upper ends of the pipes *a*, *b*, by means of the blower *i* or other suitable air-forcing device and the pipe *j*, taking care that these jets or nozzles direct the air towards the downward pipe *a*. When the air receiver *g* has become sufficiently charged with compressed air the said blower *i* may be driven by compressed air taken from the receiver *g* and let into a rotary or other engine for driving the blower, and such compressed air after passing through the engine will be allowed to expand and be reduced to a suitable pressure and enter the upper end of the pipe *a*. This air so blown into the pipe *a* together with the air forced in by the blower not only furnishes the air which is to be compressed by the apparatus, but also effects the circulation of the liquid in the pipes and consequently the compression of the whole air so supplied.

In order to relieve the pressure of liquid in the upward pipe of an apparatus of this kind, and thereby to reduce the power required to keep the liquid in the pipes in circulation I employ a siphon pipe *t* the upper end of which is connected with the upper part of the upward pipe *b* and the lower end of which is immersed in liquid *u* contained in a reservoir *v* placed at some distance below the upper end of the downward pipe *b*. In this case the liquid reservoir *d* heretofore connected with the upper end of the upward pipe must either be omitted or shut-off by a valve *r* in the pipe *s* leading up to it. The reservoir *v* will take its place. The effect of this siphon arrangement is that the pressure of liquid in the upward pipe is relieved by the weight of the column of liquid in the siphon pipe *t* above the level of the liquid *u* in the reservoir *v*, and the power required to keep the liquid in circulation is correspondingly reduced. The height of the siphon pipe must of course be somewhat less than what would completely balance the external atmosphere, for example it should not exceed about 30 feet if the liquid employed is water. The siphon pipe *t* should be provided with a valve *w* which can be closed while the apparatus and siphon pipe are being filled with liquid, and the apparatus should be provided with an air-valve to allow of the escape of air during the filling process.

In order to allow of the escape of compressed air from the air receiver *g* of the apparatus when it is not being used so quickly as it is produced, I place a loaded valve *x* at or near the top of the receiver and adapt it to be opened by a float *y* which rises and falls with the liquid in the receiver. The fall of the level of the liquid in

the receiver and consequently of the float y due to the excessive quantity of air introduced causes the valve x to open and allow the excess to escape into the atmosphere or to be led by a pipe to a storage-receiver, not shown in the drawing.

Another valve z and float z^1 may be employed to close more or less the outlet pipe z^2 of air from the receiver to the motive power engine it is intended to operate, or other purpose to which it is to be applied when by reason of the supply of compressed air thereto being less than is being used, the level of the liquid in the receiver rises to such a height as to raise the float z^1 and valve z.

Claims.

1. In apparatus for compressing air or other elastic fluid of the kind herein referred to, the combination which consists of the pipes a, b and c, the elastic fluid receiver g, means for introducing elastic fluid under pressure into the upper end of the downward pipe a, a liquid-circulating pump h disposed in a by-pass k of the upward pipe b, and valves by means of which the said pump can be disconnected from the said pipe b when it is desired to effect the circulation of the liquid in the pipes by means of the elastic fluid without the liquid pump, substantially as described.

2. In apparatus for compressing air or other elastic fluid of the kind herein referred to, the combination which consists of the pipes a, b and c, the elastic fluid receiver g, means for introducing elastic fluid under suitable pressure into the upper end of the downward pipe a, and for keeping the liquid in circulation in the said pipes, and a valve x and float y in the receiver g, substantially as described and for the purpose specified.

3. In apparatus for compressing air or other elastic fluid of the kind herein referred to, the combination which consists of the pipes a, b and c, the elastic fluid receiver g, means for introducing elastic fluid under suitable pressure into the upper end of the downward pipe a and for keeping the liquid in circulation in the said pipes, and a valve z and float z^1 in the receiver g, substantially as described and for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN GILL.

Witnesses:
SAMUEL DOW MACMILLAN,
JAMES GILL.