

(No Model.)

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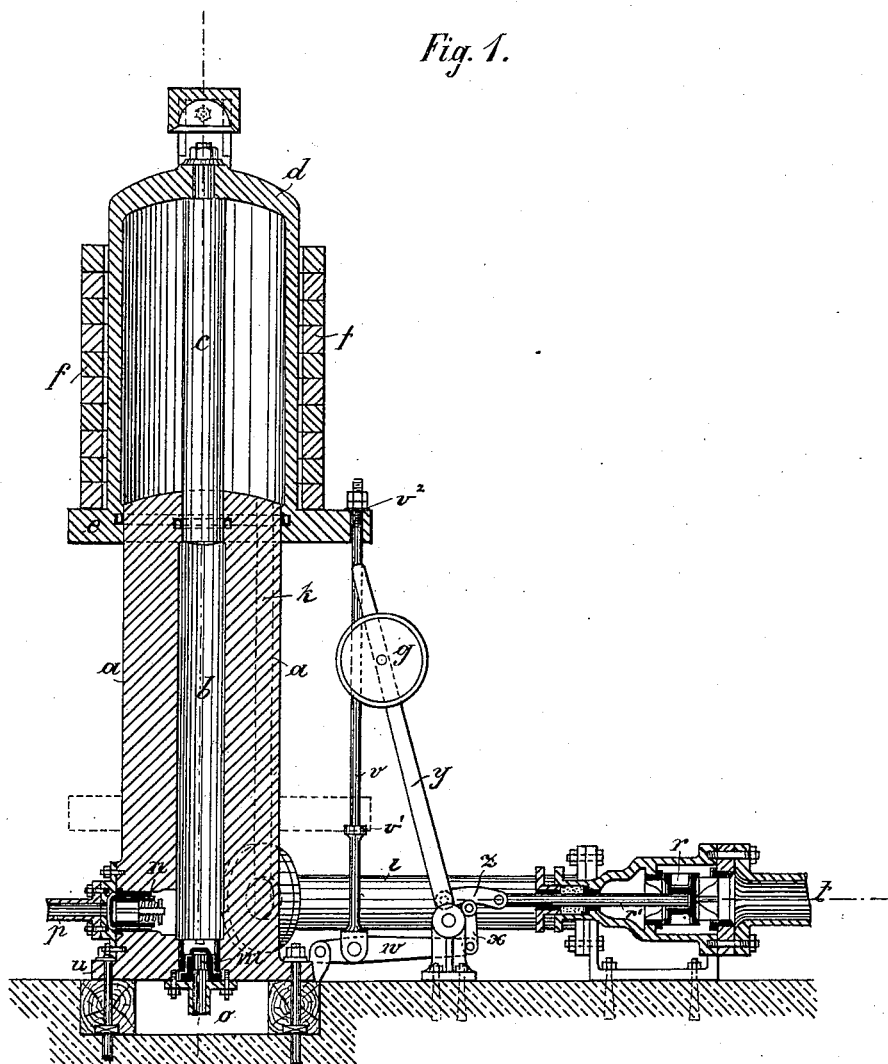
E. BOEHME.

DIFFERENTIAL ACCUMULATOR.

No. 345,360.

Patented July 13, 1886.

*Fig. 1.*



*Witnesses.*  
*T. Turner*  
*W. A. Lowe*

*Inventor.*  
*Emil Boehme*  
*per Rodin & Prissner*  
*Attorneys*

(No Model.)

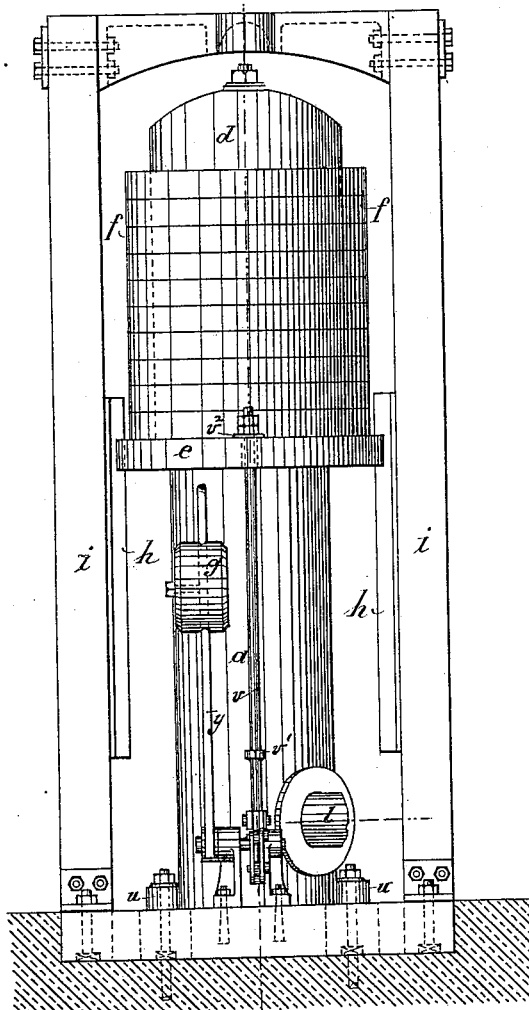
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*Fig. 2.*



*Witnesses.*

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(No Model.)

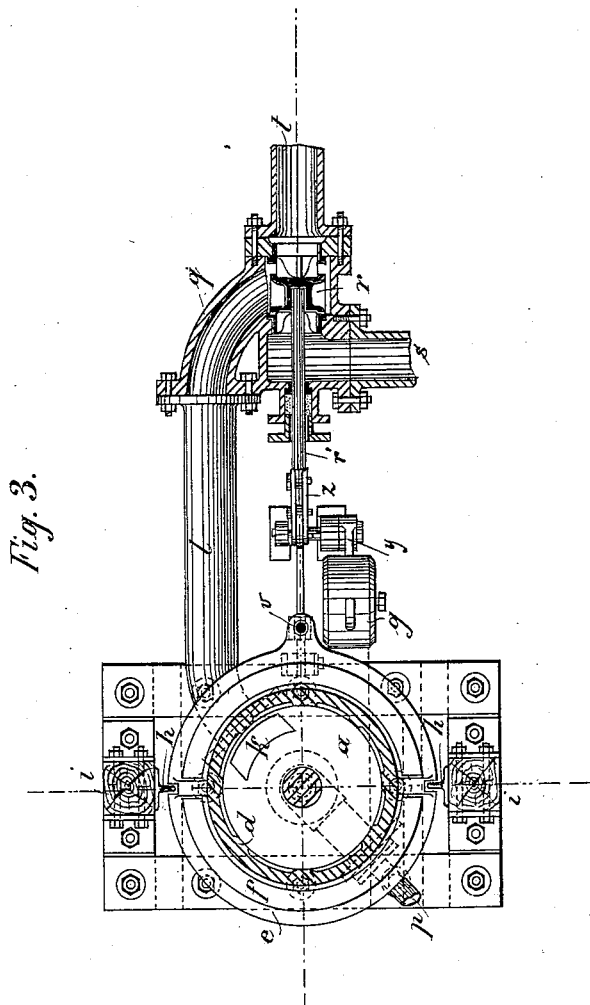
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# UNITED STATES PATENT OFFICE

EMIL BOEHME, OF BRESLAU, PRUSSIA, GERMANY.

## DIFFERENTIAL ACCUMULATOR.

SPECIFICATION forming part of Letters Patent No. 345,360, dated July 13, 1886.

Application filed April 8, 1886. Serial No. 198,307. (No model.)

*To all whom it may concern:*

Be it known that I, EMIL BOEHME, a subject of the King of Prussia, residing at Breslau, in the Kingdom of Prussia, Germany, have  
5 invented new and useful Improvements in Differential Accumulators, of which the following is a specification.

This invention relates to an apparatus by means of which it will be possible to multiply and to increase an existing hydrostatical  
10 pressure.

The invention consists in the elements of improvement hereinafter more fully pointed out.

15 In the accompanying drawings, Figure 1 is a vertical section, Fig. 2 a side view, and Fig. 3 a plan, of the machine.

The apparatus consists of a large hydraulic piston, *a*, which is fastened invariably and vertically to a bed-plate by means of a foot, *u*.  
20 The piston *a* has in its longitudinal direction a cylindrical hollow space, *b*, which serves as a hydraulic cylinder for the second small piston, *c*. This latter piston is secured in the  
25 top of the large hydraulic cylinder *d* in such a manner that their two axes will coincide. The cylinder *d* is provided at its lower part with a flange, *e*, supporting the rings *f*. The weight of the rings *f* is so calculated that the  
30 hydrostatical pressure will just be sufficiently strong to lift the cylinder *d* together with these rings *f*. To obtain a sure straight motion the cylinder *d* is guided by the guides *h h*, fixed on the pillars *i i*. The large piston *a* is provided  
35 with a passage, *k*, extending from one end nearly to the other and communicating with the pipe *l*. The piston *a* is also provided with a suction-valve, *m*, to which the pipe  
40 *o* is attached, and with a delivery-valve, *n*, connected with the pipe *p*. The pipe *l* communicates by the knee *q* with the reversing-valve *r*, and consequently alternately with the two outlets *s* and *t*, Fig. 3. When the cylinder  
45 *d* moves up and down, the valve *r* is moved to and fro by means of the rod *v*, provided with two stoppers, *v' v''*, one or both of which may be made adjustable. The rod *v* is connected to the lever *w*, carrying the jointing  
50 pieces *x*, attached to the link *z*, fast to the end of the valve-rod *r'*. To the link *z* the le-

ver *y* is attached, provided with a weight, *g*. This lever *y* is for the purpose of assuring a sure and tight closure of the valve on each side.

In the working of the apparatus, the water, 55 being under pressure, enters through the pipe *s*, the valve *r*, and through the knee *q*, pipe *l*, and passage *k* into the cylinder *d*, and lifts the same, while at the same time the piston *b* sucks water up out of a suitable vessel by 60 means of the valve *m* and the pipe *o*. If the cylinder *d* has arrived at its highest position the valve *r* is moved to the left, (position shown in the drawings,) the inlet *s* is closed, and the outlet *t* opened. The water flows thus freely 65 out of the cylinder *d*, and the latter acts with its own weight and with that of the rings *f* on the piston *c*, and consequently also on the liquid inclosed in the cylinder *b*. The suction-valve *m* is closed while the delivery-valve *n* 70 is opened, when the water, being now under a very strong pressure, is allowed to escape for the purpose of effectuating work. The ratio of this pressure to the original hydrostatic pressure is the same as that of the cross-section 75 or area of the piston *a* to the cross-section or area of the piston *c*. When the cylinder has arrived at the bottom, the valve *r* is moved to the opposite side, the outlet *t* 80 and the delivery-valve *n* are closed, while the inlet *s* is opened, and the operation begins anew.

For a continuous utilization of the multiplied hydrostatical pressure it will be necessary to mount at least two differential accumulators, and to combined the same so that 85 they may work alternately.

I claim as my invention—

The combination, in a differential accumulator, of piston *a*, provided with the channel *k*, and having cylindrical hollow space *b*, and 90 the valves *m* and *n*, with cylinder *d*, piston *c*, ring *f*, valve *r*, rod *v*, mechanism *w x y z*, and the weight *g*, substantially as described.

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

EMIL BOEHME.

Witnesses:

PAUL KRAUSE,  
EDUARD KLEINERT.