D. A. M. DOUBLET.

SAND BLAST BLOWER.

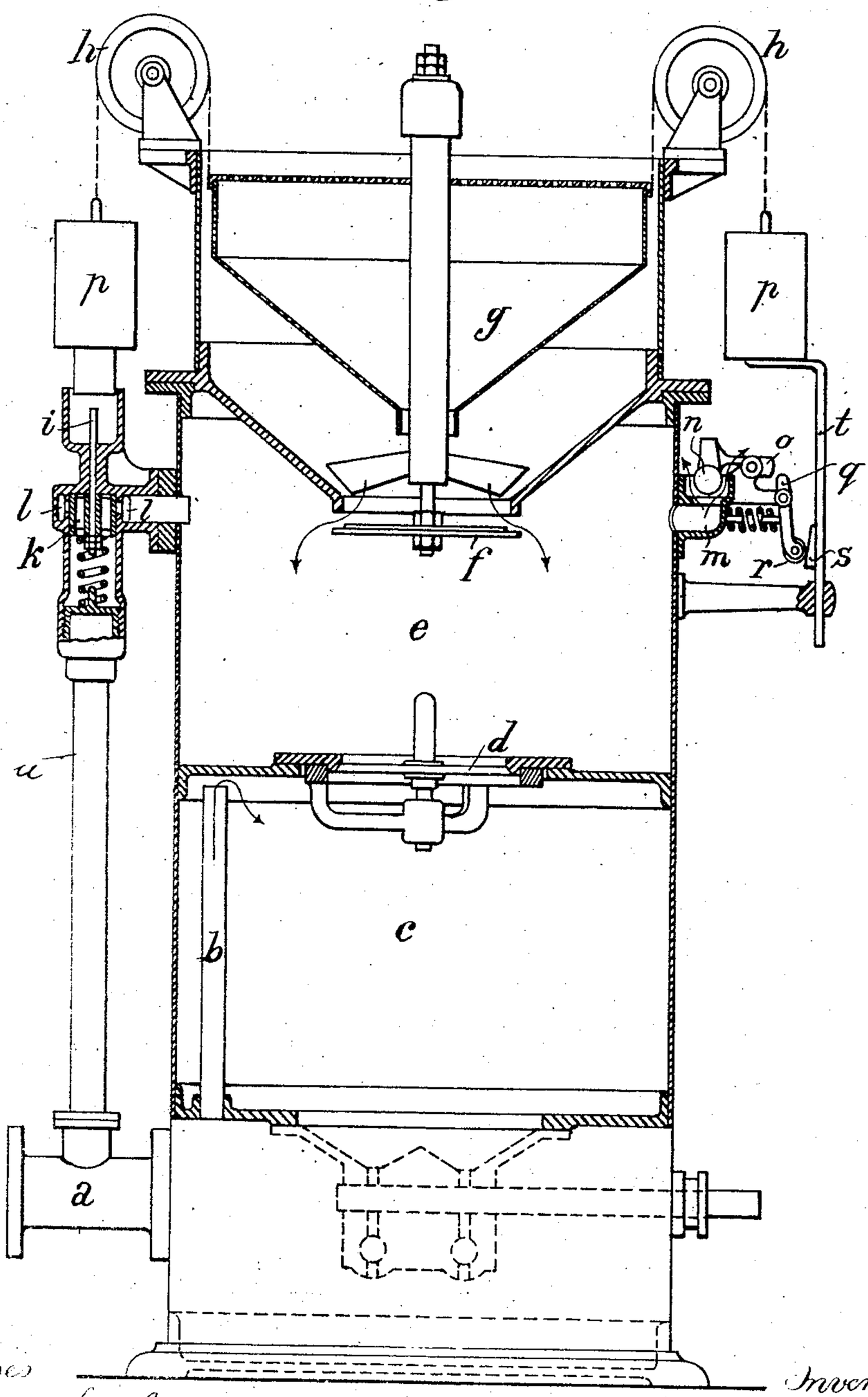
APPLICATION FILED OCT. 9, 1908.

931,579.

Patented Aug. 17, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



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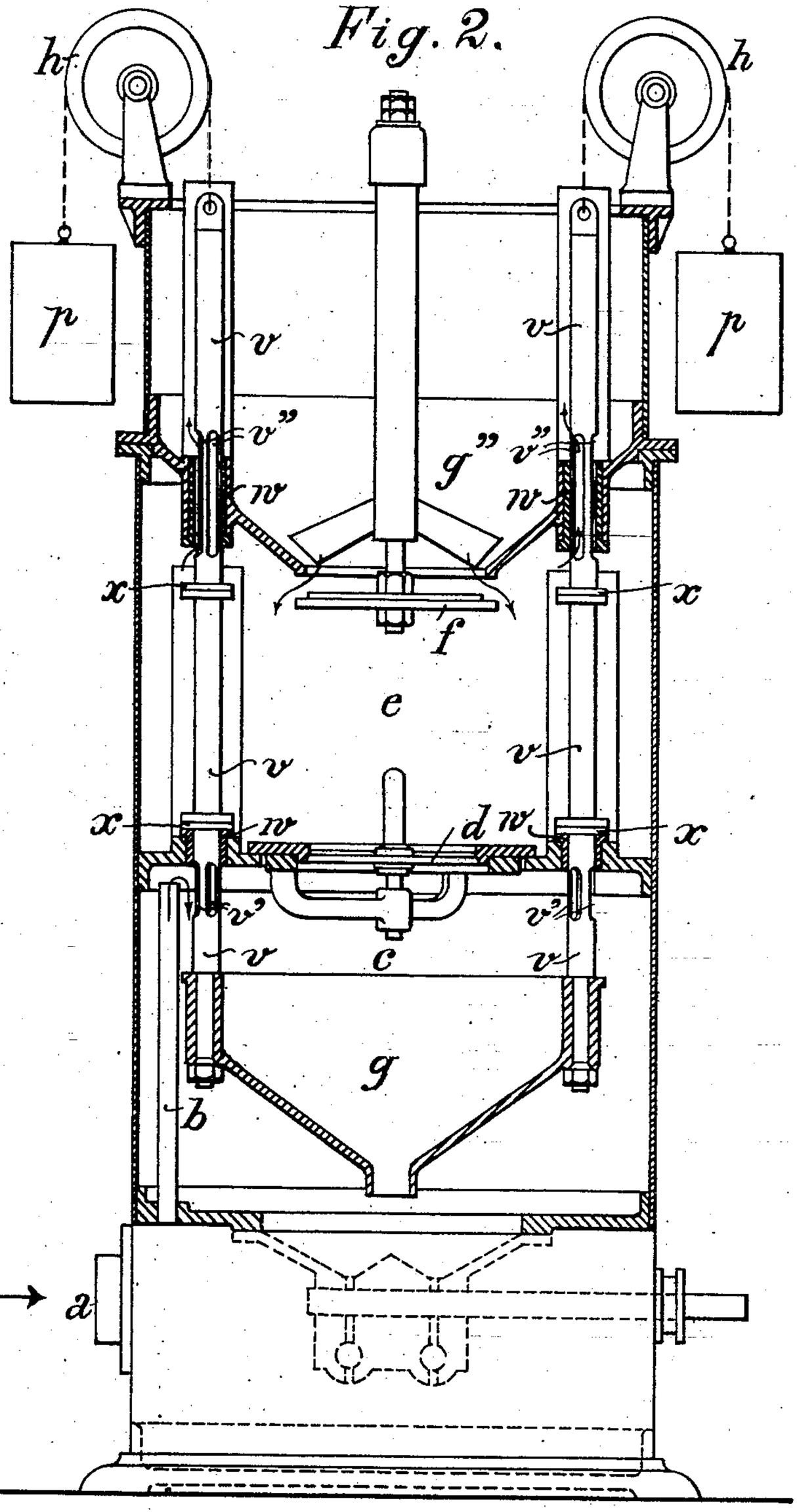
3 SHEETS—SHEET 2.

Fig. 2.



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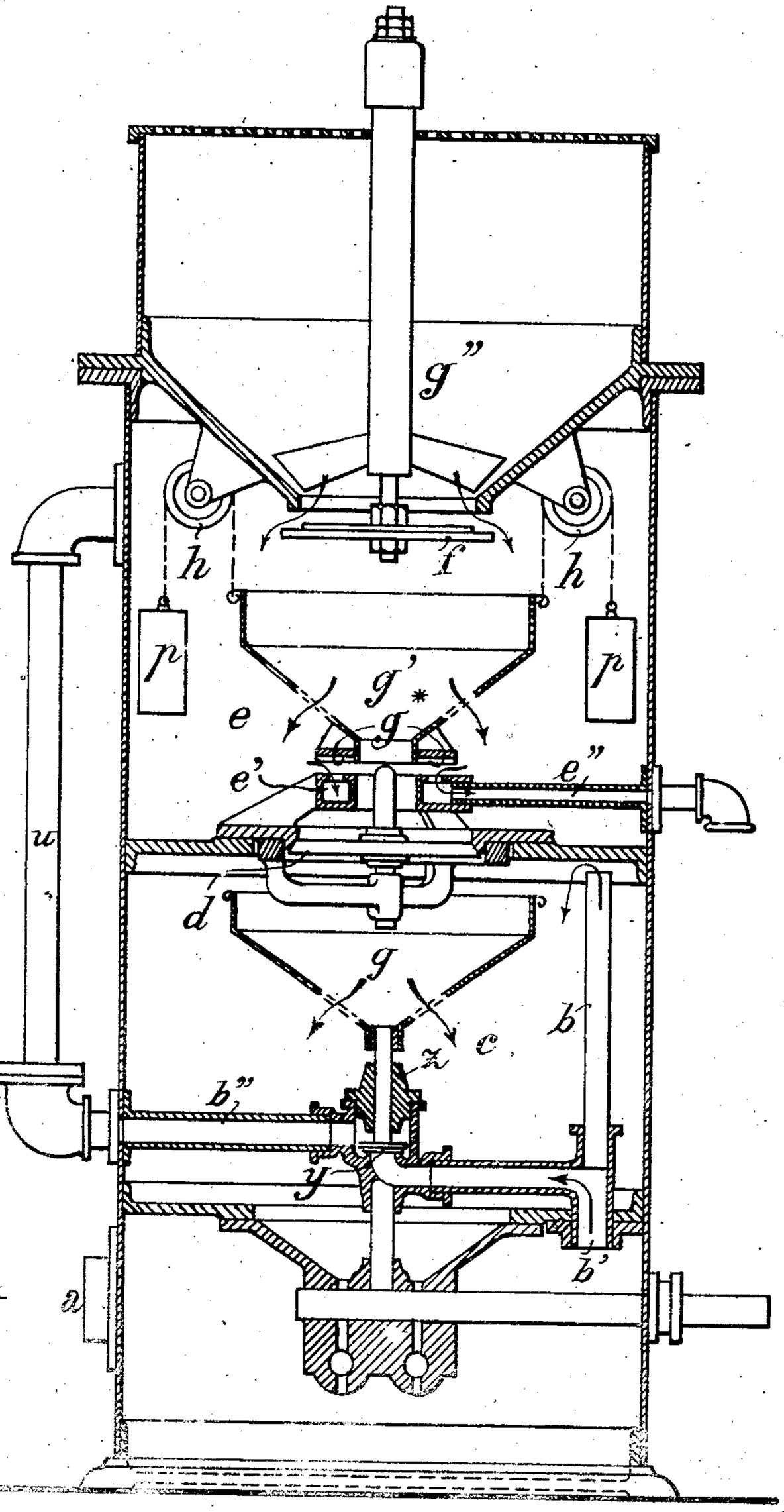
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

DIEDERICH ARNOLD MAURITZ DOUBLET, OF EIMSBÜTTEL, NEAR HAMBURG, GERMANY.

SAND-BLAST BLOWER.

No. 931,579. Specification of Letters Patent. Patented Aug. 17, 1909.

Application filed October 9, 1908. Serial No. 456,992.

To all whom it may concern:

Be it known that I, DIEDERICH ARNOLD MAURITZ DOUBLET, engineer, a subject of the Queen of the Netherlands, and resident of 133 Fruchtallée, Eimsbüttel, near Hamburg, Kingdom of Prussia, German Empire, have invented a new and useful Improvement in Sand-Blast Blowers, of which the following is a specification.

The invention relates to a sand blast blower driven by compressed air and comprising superimposed sand chambers, the upper of which is put alternately into communication with the compressed air and with the atmosphere, in order, during the period in which the connection is established with the compressed air, to supply sand to the lower chamber from which the blast nozzle is fed. Instead of one upper chamber, however, the sand blast blower may comprise two or more disposed in juxtaposition or in series and placed alternately in communication with the compressed air and with the atmosphere.

The invention aims in particular to effect the sand supply to the lower chamber (from which the blast nozzle is fed), in an automatic manner such that the sand consumption shall automatically control the supply of sand to the nozzle, in accordance with the character of the material and independently of a given period of time or of motive power operating externally to the apparatus.

An automatic reversal of two sand chambers for the purpose of attaining continuous working is *per se* known. Such arrangements are however dependent upon mechanism having no connection with the working of the blower; the reversal is effected at fixed intervals of time, without regard to whether the consumption of sand is greater or less, or to whether coarser or finer sand is being employed or the apparatus is working at high or low pressure. All these conditions, according to circumstances, call for a more rapidly or more slowly effected reversal which cannot be attained with the apparatus hitherto employed, as the speed of the mechanism can only be altered in a very tedious and limited manner by hand. The time reversal method therefore gives no absolute certainty for a permanent feed of sand to the nozzle, and in particular the blower continues to operate during interruptions in the working of the mechanism. The working of the blower is then like that of badly attended non-automatically reversed apparatus.

In the apparatus of the present invention the reversal is made dependent upon the weight of the sand still in the collecting hopper. It therefore adapts itself perfectly automatically to the working of the apparatus and retards or accelerates the sand feed entirely in accordance with the consumption. Thus the highest efficiency is attained of which an automatic arrangement is capable.

Figure 1 is a central vertical section and partial elevation illustrating my improved sand blast blower. Fig. 2 is a similar view illustrating a modified form of the invention and Fig. 3 is also a view similar to Fig. 1, illustrating a still further modified form of the invention.

In the form shown in Fig. 1 the compressed air is admitted by the pipe *a* and passes by the pipe *b* into the lower chamber *c*. The upper chamber *e* is adapted to be put into communication with the pressure pipe by a valve *k* and pipe *u*, and with the atmosphere by a valve *n*. So long as the chamber *e* is in communication with the atmosphere, the excess of pressure in the chamber *c* keeps the valve *d* closed. The hopper or container *g* filled with sand and which is connected above the chamber *e* to the weights *p* by ropes or the like passing over rollers *h*, is in its lowest position. The upper valve *f* of the chamber *e* is open and allows the sand to run out of the hopper *g* into the chamber *e*. The compressed air passing up to the pipe *u* is prevented from entering the chamber *e* by the hollow piston valve *k* which is held in its raised position by a spring to close the connection with the annular passage *l*. At the same time the air can escape from the chamber *e* into the atmosphere through the ball valve *n* on the right. When the hopper *g* has emptied to such an extent that the weights *p* are the heavier, these descend and the hopper *g* rises. The left hand weight strikes the spindle *i* of the piston valve *k* and forces the latter down until its upper edge uncovers the lateral openings of the annular passage *l* and thus allows the compressed air to enter the chamber *e*. At the same time the right hand weight forces down the rod *t* the nose *s* of which then releases a lever *r* which is kept pressed to the right by a spring; the tail *q* of this lever is thus rocked to the left and comes under the nose *o* and closes the ball valve *n* so as to pre-

vent the compressed air from escaping through the outlet pipe *m*. The compressed air in the chamber *e* lifts the valve *f* and thereby establishes equal pressure in the chambers *e* and *c*. The valve *d* now opens under its own weight and the sand falls into the chamber *c*. Meanwhile the hopper *g* has been again filled with sand to such an extent as to be heavier than the weights *p*. It therefore sinks and the weights *p* rise, releasing the piston valve *k* and ball valve *n*, so that the upper chamber *e* is again cut off from the compressed air and put into communication with the atmosphere, the result of which is that the valve *d* closes automatically and the valve *n* opens. The cycle of operations now recommences.

In the construction shown in Fig. 2 the movable hopper *g* is fitted in the lower chamber *c*. The compressed air is admitted to the blower by the pipe *a* and led into the lower chamber by the pipe *b* as before. The movable hopper *g* is suspended from three round rods *v* working in bushes *w* in the top and bottom of the chamber *e* and is connected at top to ropes passing around rollers *h* and attached to counterweights *p*. The latter keep the hopper *g* in its raised position when it is empty. The rods *v* are each formed with three grooves or channels *v'* and *v''* and with two flanges upon and under which respectively are provided rubber packing rings *x*. When the hopper *g* is filled with sand and is in its lowest position, the channels *v'* are wholly in the chamber *c* and the latter is cut off air tight from the upper chamber *e* by the lower flanges and rubber packing ring *x* of the rods *v*. On the other hand, the channels *v''* are in a position in which they place the chamber *e* in communication with the outer air in the hopper *g''*. The valve *f* is therefore open and the sand falls from the hopper *g''* into the chamber *e*. When however the hopper *g* has emptied to such an extent that the weights *p* are the heavier, the latter raise it so that the channels *v''* pass into the bushes *w* and the upper packing rings *x* are pressed by their flanges against the latter, the lower channels *v'* rising into such a position as to allow the compressed air to enter the chamber *e* through the lower bushes. The upper chamber *e* is now cut off from the atmosphere and is in communication with the compressed air. The valve *f* therefore closes automatically and the valve *d* opens and allows the sand to fall from the chamber *e* into the hopper *g* until this is filled sufficiently to cause it to descend, whereupon the series of operations recommences.

In the construction shown in Fig. 3 two movable hoppers or containers are provided, each in a chamber. The compressed air is admitted to the blower by the pipe *a* and passes by the pipe *b' b* into the lower chamber *c*. The lower hopper or container *g* in the chamber *c* is mounted on the spindle of a valve *y* fitted in the compressed air conduit *b' b'' u*, this spindle working in a bush *z*. The upper hopper or container *g'* is suspended in the chamber *e* by ropes passing over rollers *h* and attached to the counterweights *p*. In the position shown the chamber *c* is under pressure and the hopper *g* is filled with sand and is in its lowest position in which it keeps the valve *y* shut and prevents the compressed air from passing to the chamber *e* by the pipes *b'' u*. The valve *d* is kept closed by the excess of pressure in the chamber *c*. The hopper *g'* in the upper chamber *e* is in its raised position. The chamber *e* is in communication with the atmosphere by the round box *e'* formed with openings at the top, and by the pipe *e''*. Consequently the upper valve *f* of chamber *e* is open and the sand runs from the hopper *g''* into the hopper *g'* suspended below it. As soon as the latter is filled to a sufficient extent to overcome the pull of the counterweights *p*, it descends and closes the box *e'* by means of the flange *g** fitted with a rubber packing ring, so that no air can now escape from the chamber *e*. At the same time the hopper *g* empties, the greater pressure in the chamber *c* lifts the valve *y* with the hopper *g* and the compressed air passes by the pipes *b''* and *u* into the chamber *e* and at once closes the valve *f*. The pressure in the chambers *e* and *c* is now equal and the valve *d* opens by its own weight and allows the sand to run into the hopper *g*, which is thus caused to descend and close the valve *y*. At the same time the hopper *g'* is emptied and is lifted by the weights *p* and allowed the compressed air to escape from the chamber *e* into the atmosphere through the box *e'*, the series of operations then recommencing.

Without departing from the scope of the invention I may in all the examples illustrated employ two or more upper chambers instead of one, said chambers being arranged in juxtaposition or in series and being adapted to be put into communication with the compressed air and with the atmosphere alternately. For this purpose, the sand hoppers in the lower chamber are attached to a lever connected through a lever system with a three-way valve, disposed between the upper chambers and communicating with the compressed air pipe and the atmopshere, the arrangement being such that according to the position,—*i. e.* filling or emptying—of the lower sand hopper, the three-way valve is reversed and the upper chamber is put into communication either with the compressed air pipe or with the atmosphere.

What I claim is:—

1. A sand blast blower comprising superimposed chambers, a source of compressed air, and means for placing an upper chamber

alternately in communication with the source of compressed air and with the atmosphere for the purpose of transferring the sand intermittently from an upper chamber to a chamber below the same, in combination with a sand hopper and means operated by the weight of sand in the hopper for effecting the reversal.

2. A sand blast blower comprising a lower chamber and a plurality of upper chambers disposed above the same, and means for placing the upper chambers alternately in communication with the source of compressed air and with the atmosphere, in combination with sand hoppers, and means operated by the weight of the sand in the hoppers, for effecting the reversal.

3. A sand blast blower comprising superimposed chambers, a source of compressed air and means for placing an upper chamber alternately in communication with the source of compressed air and with the atmosphere for the purpose of transferring sand intermittently from an upper chamber to a lower chamber, in combination with a movable sand hopper means for causing the same to rise and fall under the action of filling and emptying, and means actuated through the rise and fall of the hopper for effecting the reversal, whereby the reversal depends on the weight of sand remaining in the hopper and adapts itself to changes in the working of the blower automatically and independently of fixed intervals of time.

4. A sand blast blower comprising super imposed chambers, a source of compressed air, and means for placing an upper chamber alternately in communication with the source of compressed air and with the atmosphere for the purpose of transferring the sand intermittently from an upper chamber to a chamber below the same, in combination with a sand hopper arranged in the lower chamber and means operated by the weight of sand in the hopper for effecting the reversal.

5. A sand blast blower comprising a casing, a transverse partition in said casing, dividing the interior thereof into superimposed chambers, a hopper-shaped cover for said casing over the upper chamber, a movable hopper in the lower chamber, means for admitting compressed air into the said chambers and means for supporting the said movable hopper so that the same is moved downwardly by the weight of the material contained therein, at the same time placing the said upper chamber into communication with the atmosphere and causing it to rise and at the same time to close the upper chamber from communication with the atmosphere and to place the same in communication with the said lower chamber.

6. A sand blast blower comprising a casing, a transverse partition in said casing, dividing the interior thereof into superimposed chambers, a door in the said transverse partition, a hopper-shaped cover for said casing above the said upper chamber, a gate in the said hopper-shaped cover, a movable hopper in the lower chamber, means for admitting compressed air to the said chambers and means for supporting the said movable hopper so that the same is caused to descend by the weight of the material contained therein and at the same time to open the said gate in the hopper-shaped cover to place the upper chamber in communication with the atmosphere and upon being emptied is caused to rise automatically and at the same time to close the said gate in the said hopper-shaped cover and to open the door in the said transverse partition.

7. A sand blast blower comprising a casing, a partition extending transversely across the interior of the said casing and dividing the same into superimposed chambers, a door in the said partition, bearings also in the said partition, a hopper-shaped cover for the said casing forming the top of the said upper partition a gate in the said hopper-shaped cover, bearings also in the said hopper-shaped cover, a movable hopper in the said lower chamber, rods passing through and journaled in the said bearings in both the said partition and hopper-shaped cover and secured to the said movable hopper, the said rods being provided with channels adjacent to both the said bearings, pulleys, supports for the same, cords passing over said pulleys and secured at one end to the said rods, and counter-weights secured to the other ends of the said cords, and means whereby compressed air is admitted to the said chambers.

8. A sand blast blower comprising a blast chamber, a sand chamber, a source of compressed air, means for placing the said sand chamber alternately in communication with the source of compressed air and with the atmosphere for the purpose of intermittently supplying sand to the said sand chamber, a sand hopper and means operated by the weight of the sand in the said hopper for effecting the said reversal.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses this 24th day of September, 1908.

DIEDERICH ARNOLD MAURITZ DOUBLET.

Witnesses:

ERNEST A. H. L. MUMMENHOFF,

OTTO W. HEILMRICH.