

(Model.)

2 Sheets—Sheet 1.

W. A. PAGE.
Lime-Kiln.

No. 227,872.

Patented May 18, 1880.

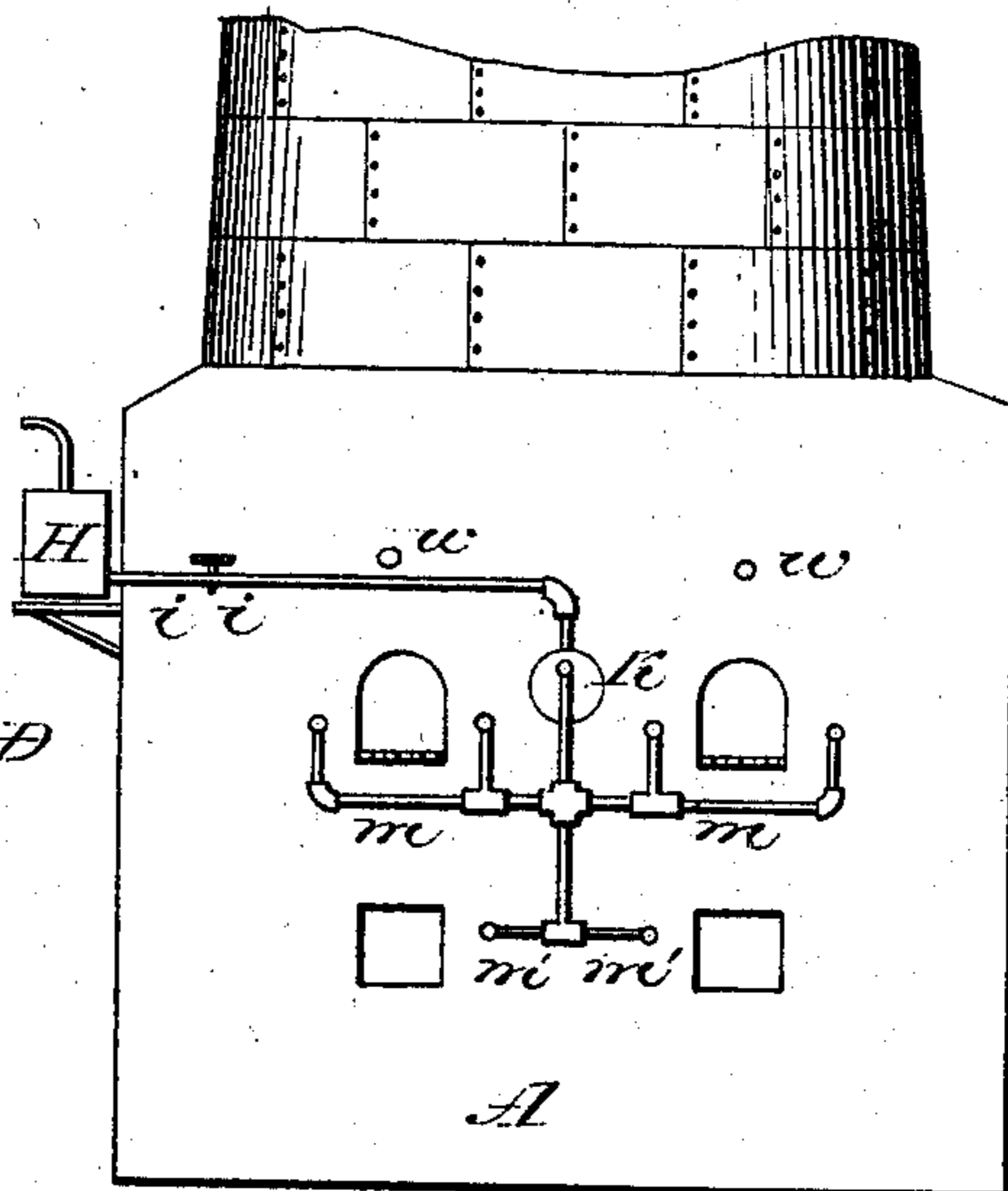
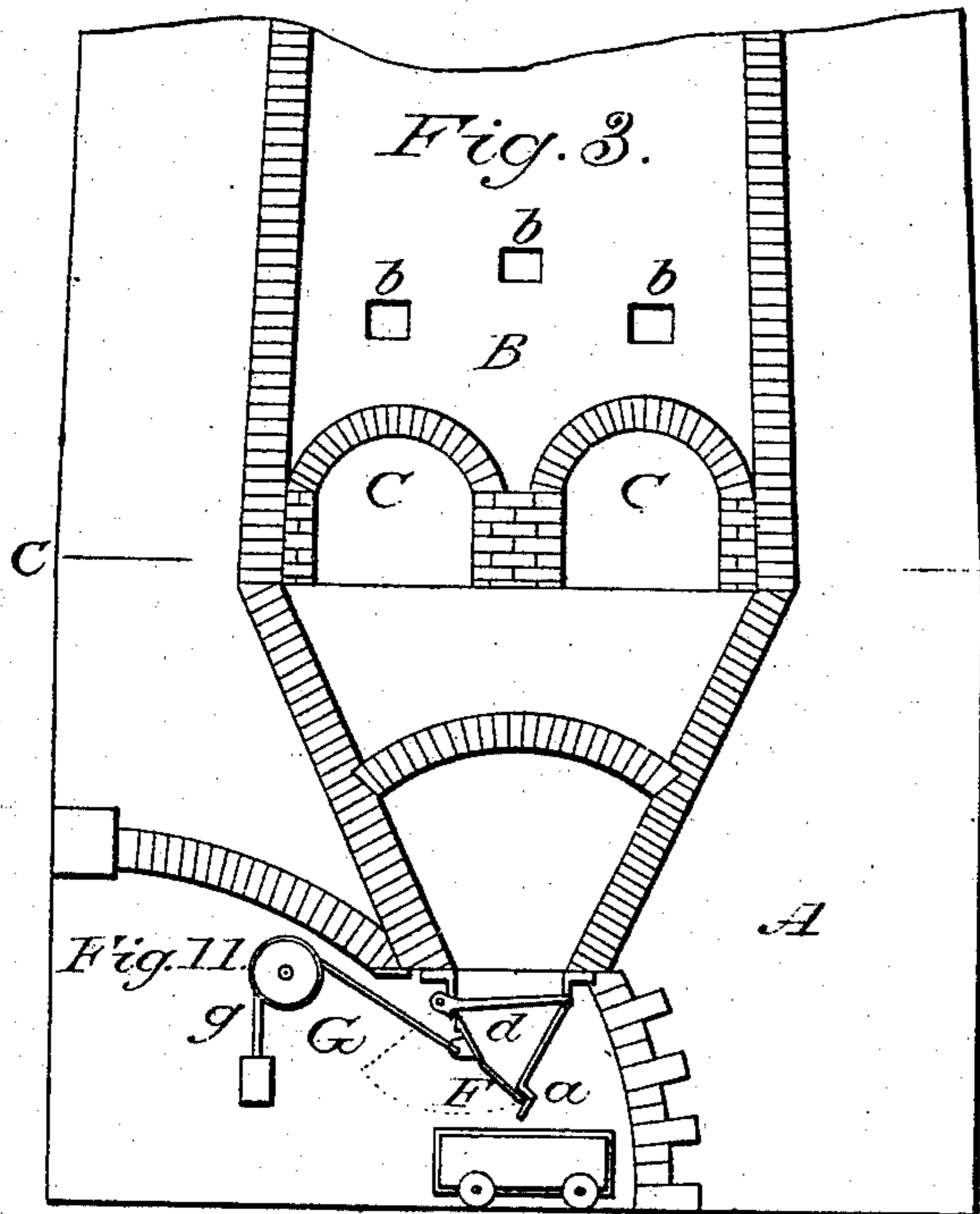
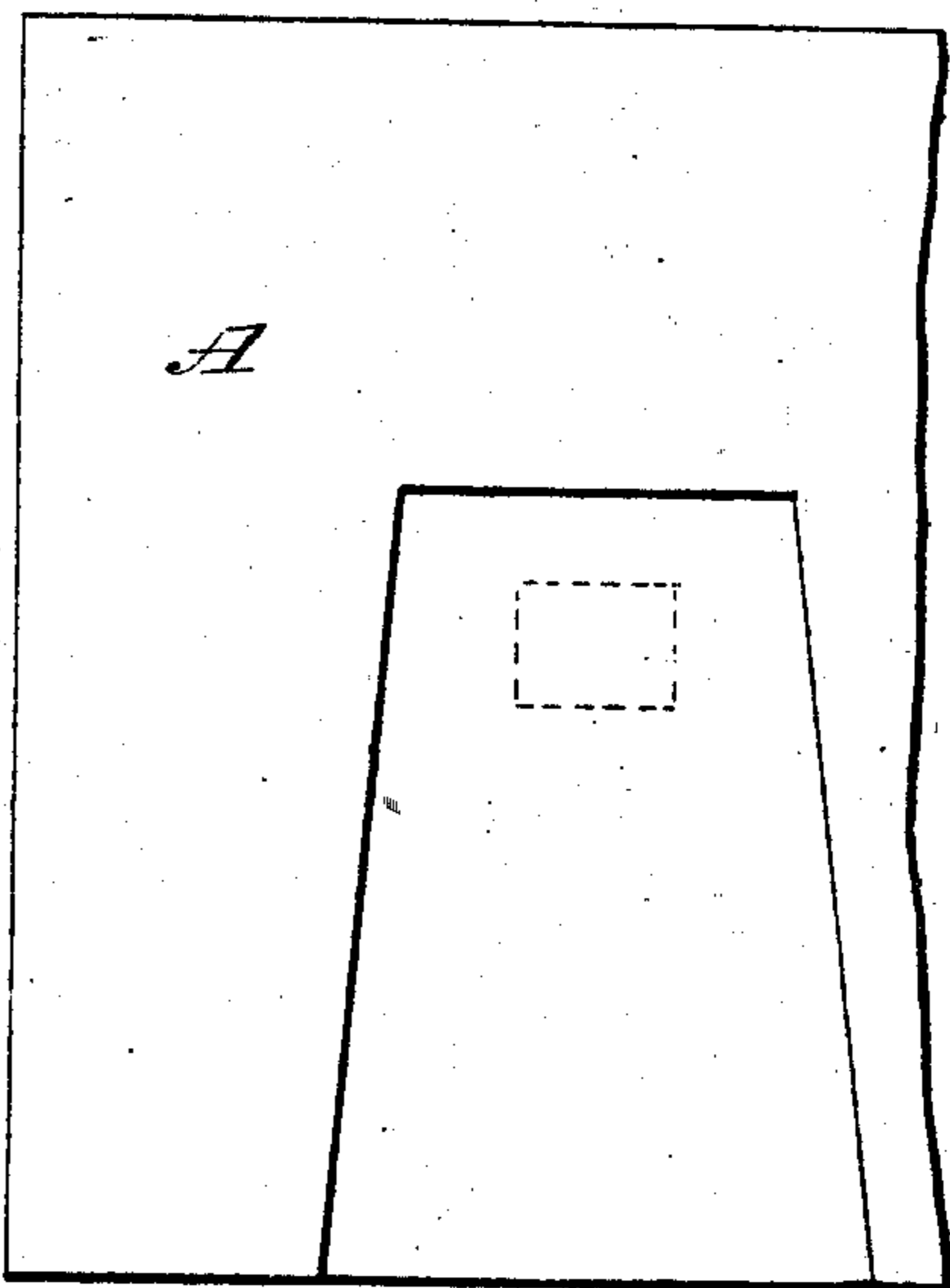
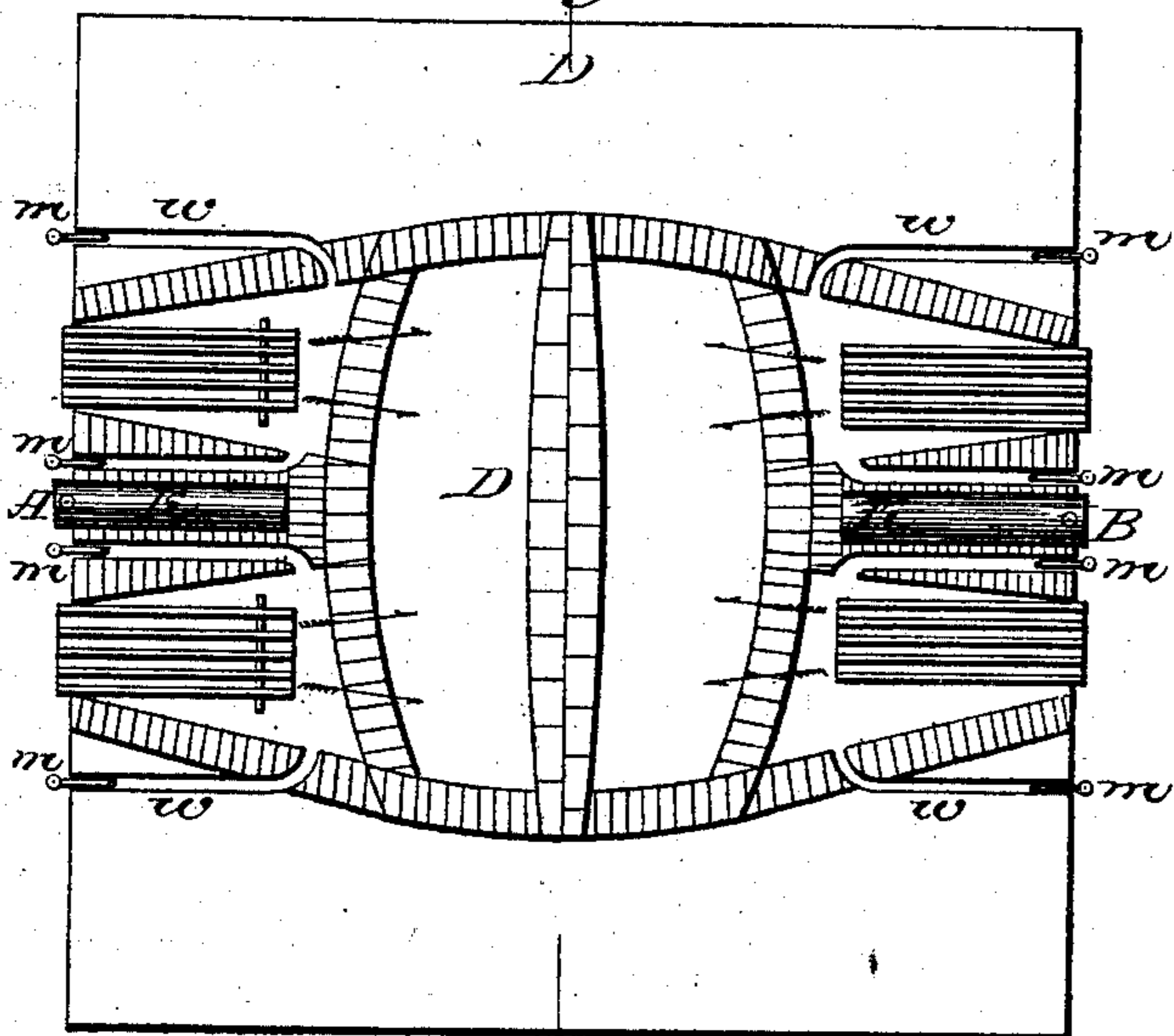


Fig. 2.

Fig. 1.



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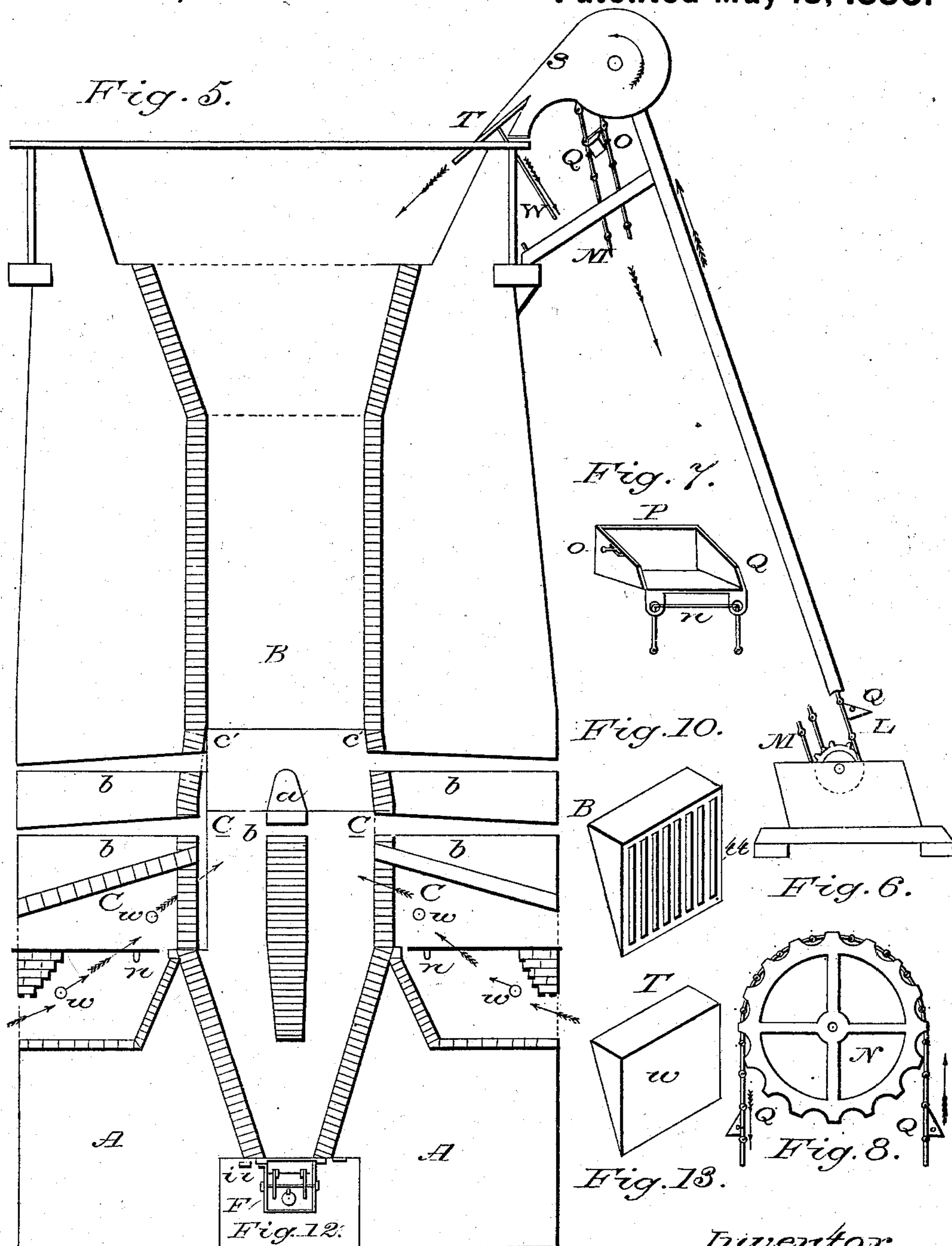
(Model.)

2 Sheets—Sheet 2.

W. A. PAGE.
Lime-Kiln.

No. 227,872.

Patented May 18, 1880.



Witnesses:
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William A. Page
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UNITED STATES PATENT OFFICE.

WILLIAM A. PAGE, OF ROCHESTER, NEW YORK, ASSIGNOR OF THREE-FOURTHS OF HIS RIGHT TO CLARK D. PAGE, OF LIMESTONE SPRINGS, SOUTH CAROLINA.

LIMEKILN.

SPECIFICATION forming part of Letters Patent No. 227,872, dated May 18, 1880.

Application filed May 24, 1879.

To all whom it may concern:

Be it known that I, WILLIAM A. PAGE, of the city of Rochester, in the county of Monroe and State of New York, have invented a certain new and useful Improvement in Limekilns; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a ground plan of the lower portion of the kiln. Fig. 2 is a cross-section of the same in line of A B in Figs. 3 and 5. Fig. 3 is a vertical section in line of C to D in Fig. 2, showing shape of cupola, and drawing apparatus. Fig. 4 is a perspective view of side elevation, showing a portion of an iron stack, steam apparatus, water-tank, ash-pits, and furnace-doors. Fig. 5 is a vertical section, showing peculiar shape of cupola, division-wall, ash-pits, and furnaces, and front view of draw-kettle. Fig. 6 is a vertical section of derrick, detached chains, screen, apron, buckets, and driving-wheel, &c. Fig. 7 is a perspective view of bucket on enlarged scale, showing bolt *n*, lug *b'*, attached to chain. Fig. 8 shows side view of top wheel on enlarged scale with a portion of chain and buckets. Fig. 9 shows top view of derrick attached to kiln, screen-sifter, and sand-apron, portion of chains, and bucket on their course downward. Fig. 10 is a barred spout (for sifting fine stone and sand) on enlarged scale. Fig. 11 is an elevation of weighted roller for opening the lid for the discharge of lime into car. Fig. 12 is a modification of same. Fig. 13 is a view of sand-apron, on enlarged scale, to carry off dirt and small stone outside the kiln.

My improvement relates to coal-burning limekilns.

The invention consists in the construction and arrangement of parts hereinafter more fully described and definitely claimed.

A represents the kiln, which may be built of stone, as usual, and the upper portion may be iron-clad, as shown in Fig. 4, or with all stone, as shown in Fig. 5, and lined inside with fire-brick.

The upper portion of the cupola B is of or-

dinary form, but opposite the furnaces C C is of peculiar construction. Directly opposite, and between the furnaces, is a division-wall, D, starting at a point below the furnaces and extending upward some distance above the furnaces, as is shown in Figs. 2 and 5. At its top is a coping-block, *a*, wedge-shaped, as shown, to divide the charge and throw off on both sides into the space beneath. The wall is perforated directly beneath the coping-block by a series of flue-passages, *b b*, and above these is a second series, the object being, if the stone hangs to coping-block, to enable a poker to be inserted from the side holes to punch the stone off. For this purpose the ends of the flues above the furnaces are made enlarged to enable the pokers to be easily inserted and to strike the lime at different points.

The sides *c c* of the cupola opposite the division-wall D are carried up vertically on a line with the top of the coping-block, and from this point upward the said sides of the cupola are made inclined till they meet the vertical sides above, as shown at *c' c'*. This angle is of such extent that the passages between the inclined sides and coping-block are equal in capacity to the passages, the division-wall, and the vertical sides *c c* of the cupola, by which means a free discharge of the calcined stone is allowed downward, and no obstruction can occur.

Division-walls have before been used in limekilns, but rising some inches below the upper side of the furnace-arch instead of above it, and in such cases their object has been to furnish a bed for and hold up the stone while it is subjected to the action of the fires, and while drawing below, as the stone would settle and obstruct the drawing action; but in my present invention I so arrange the lower end of the kiln that perpetual drawing may be accomplished, and therefore carry the wall D some distance above the arch of the furnaces, also enlarge the passage of the cupola each side of the wall, by which means the stone clears itself and never becomes obstructed. This wall, by rising above the furnaces, also breaks the through-draft of the furnaces and deflects it upward, where it will be most effective in its

action on the stone. *n n* in ash-pit are grate-bearers set at right angles with the grates to support the same.

Figs. 3 and 5 represent the contracted or angular throat of the cupola at the bottom, where the lime is discharged. It has a chute, *a*, which throws the material off into a car which rests on ways and is run into the mouth of the kiln.

F is a lid which is hung by hinges *i i*. By this means the lid is drawn upward. By means of weighted cord the lid will be opened, allowing the lime to pass out freely into the car. By raising the weighted cord the lid *F* will drop into the offset in chute *a*, and is held closed by means of drop-latch *d*. By this means the lime may be conveniently drawn from cupola as fast as calcined instead of large charges, as in ordinary limekilns, thereby making the kiln a self-discharger.

Figs. 2 and 4 show a steam apparatus for ejecting steam into the furnaces and ash-pits by means of a series of pipes leading from boiler *K* into flues *w w*, as is shown in Figs. 2 and 5. (See round holes in ash-pit and furnaces.)

The boiler is set, as shown in Fig. 2, in the division-wall between the furnaces. No direct heat is applied, as the furnace-walls conduct heat quite sufficient to generate steam, thereby using no extra heat. This boiler *K* is supplied with water by an exterior tank, *H*, as shown in Fig. 4; water-pipes *i i* leading from tank *H* to boiler *K*.

Steam is not confined to a high pressure, but passes off freely, only slightly confined by stop-cocks for the purpose of conducting more or less steam at different points, as may be required, the boiler *K* having branch pipes *m m* conducting steam downward and leading through the kiln into the furnaces and the ash-pits. The pipes *m m* pass into furnaces through flues *w w* and to the rear side thereof and near the body of lime. At this point the jets of steam are most effective in increasing the draft by injection up through the furnaces, and also mingling with the burning coal at the point farthest from the ingress of the air. It assists the combustion by furnishing oxygen. It also absorbs sulphurous gases, and thereby prevents them from being absorbed by the lime, thus producing a better quality of lime.

The pipes *m' m'*, which enter the ash-pit, open through the sides of the ash-pit and assist the combustion, also have the tendency to prevent burning out of the grates.

The steam-pipes entering the furnaces may be arranged by the use of cocks to discharge more or less steam at pleasure, thereby injecting enough to assist combustion, or a greater quantity to deaden the fires when too hot.

L, Fig. 6, is a derrick, standing in an inclined position and resting against the top of the kiln. *M* are two endless chains passing around a spoked wheel, *N*, at the top and a geared wheel at the bottom. Power is applied

to wheel *N* in any desired manner to impart motion to the chains.

Q Q are buckets attached at intervals to the chains and forming elevators to raise the stone from the ground and discharge it into the top of the kiln. These buckets are constructed, as is shown in Fig. 7 on enlarged perspective scale, with two right-angled lugs, *o o*, at the upper edge, also a horizontal shelf, *P*, which forms the receptacle for the stone. The bolt *n* enters the links of chain and through the shanks of bucket, serving as the pivots on which the bucket turns. Bolt *n* is riveted to the bucket and chain only at intervals, same as the buckets, serving also as a rivet in holding the chain together and prevents the chain from spreading and keeps them in their proper position. These buckets pass upward between two inclined timbers provided with grooves to keep them in their proper place.

S, Fig. 9, is a chute or spout to catch the stone as it falls from the buckets and conveying it to the cupola.

T is a screen located in the chute *S* in an inclined position and serving to sift the dirt from the stone as it falls thereon and preventing it from obstructing the draft of the kiln. The bars *t t* run lengthwise of the screen, and the screen is so located that the dirt sifted out will fall outside of the kiln, being conducted out by the inclined apron *W*.

Having thus described my invention, I do not claim, broadly, a division-wall within the cupola nor a steam-boiler set in a kiln only for the purpose fully described; but

What I claim herein as new is—

1. In a limekiln, the combination of the division-wall *D*, projecting above the furnace-arches and provided with flues *b b*, and the enlarged passages *c' c'* of the cupola above the division-wall, as shown and described, and for the purpose specified.

2. In a limekiln, the combination of the angular lid *F*, for opening and closing the discharge-passage of the cupola, it striking in the offset *a* and held closed by latch *d*, and the windlass *G* and weighted cord *g*, for operating said lid, as shown and described, and for the purpose specified.

3. In a limekiln, the water and steam apparatus, consisting of the water-tank *H*, the connecting-pipes *I I*, the steam-boiler *K*, and the steam-pipes *m m*, combined and arranged to operate as and for the purpose specified.

4. In a limekiln, the steam-pipes *m m* and flues *w w*, the steam being conducted to the rear of the furnace-arch and entering in the space near the fire directly between the coal and lime, also the steam being conducted through pipes *m' m'* into ash-pits and under the grates, in the manner and for the purpose specified.

5. In a limekiln, the combination, with the derrick *L*, endless chains *M M*, and buckets *Q Q*, of the screen *T* and apron *W*, as shown and described, and for the purpose specified.

6. The combination, with the chains *M M*, of the buckets *Q* constructed with the bolt *n*,

attached and riveted to the buckets and links of the chain and to hold the parts together, as shown and described, and for the purpose specified.

5 7. The combination, with the endless chain and buckets and the top of the kiln, of the screen T, resting beneath the discharge-buckets and over the edge of the kiln, and sliding the stone into the kiln as it falls from the

buckets, and for removing dirt from the stone 10 as it falls onto apron W and discharging same outside the kiln, as shown and described, and for the purpose specified.

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