

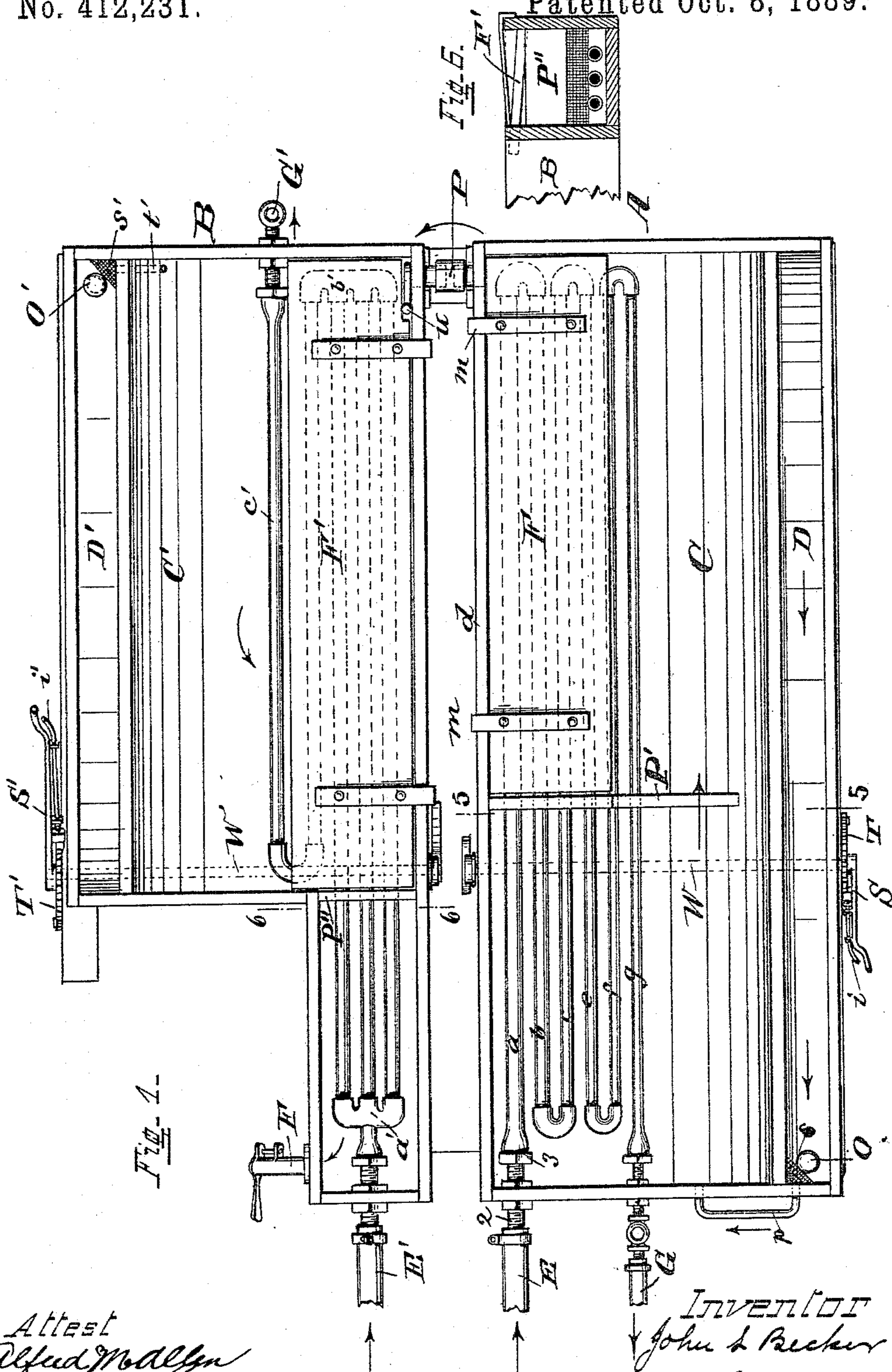
(No Model.)

2 Sheets—Sheet 1.

J. L. BECKER.
EVAPORATING PAN.

No. 412,231.

Patented Oct. 8, 1889.



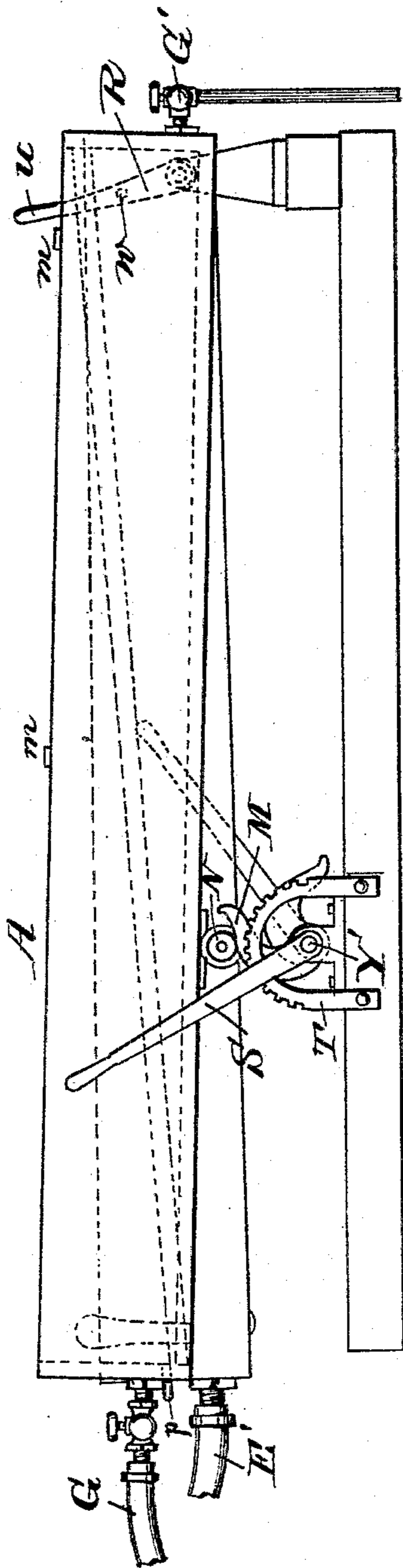
Attest
Alfred Mallen
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INVENTOR
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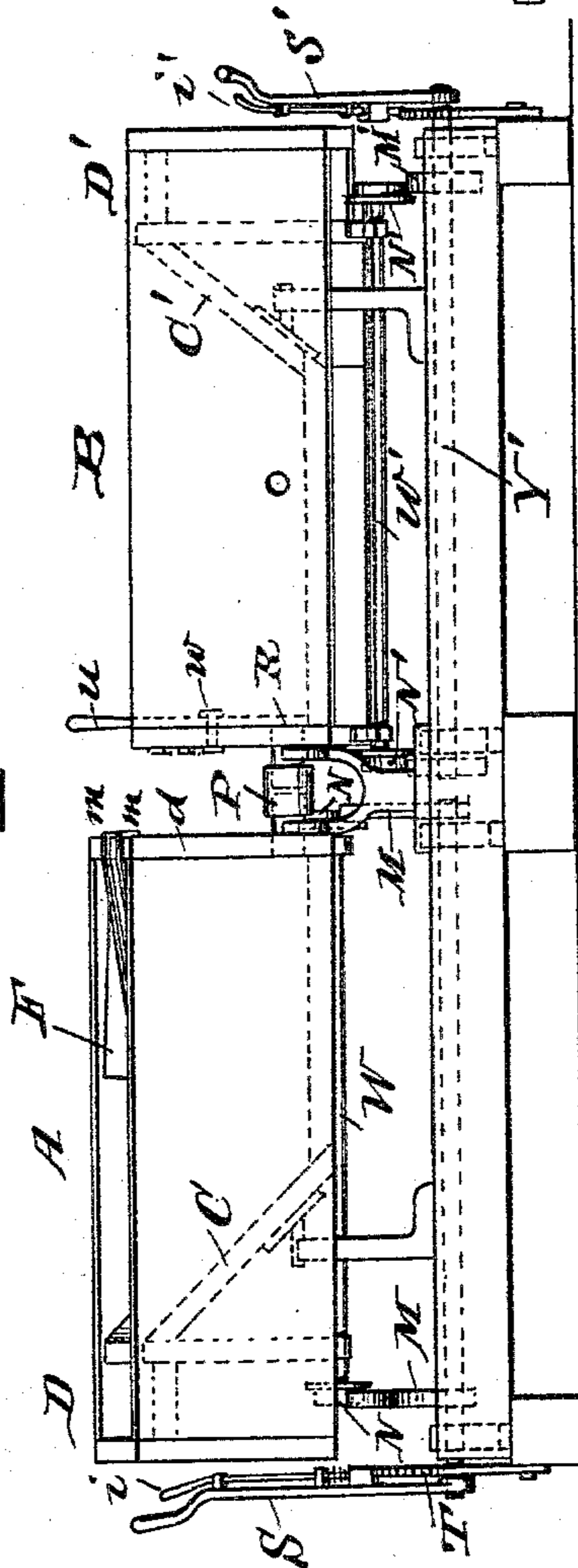
2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

JOHN L. BECKER, OF HARTWELL, ASSIGNOR TO THE BLYMYER IRON WORKS COMPANY, OF CINCINNATI, OHIO.

EVAPORATING-PAN.

SPECIFICATION forming part of Letters Patent No. 412,231, dated October 8, 1889.

Application filed March 18, 1889. Serial No. 303,772. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. BECKER, a citizen of the United States, residing at Hartwell, in the county of Hamilton and State of Ohio, have invented a certain new and useful Improvement in Evaporating-Pans, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to evaporating-pans such as are used in the manufacture of sirup and sugar, in which the heat required is supplied artificially by means of steam-heated coils of pipe; and it consists in the construction and arrangement of parts, as hereinafter shown.

My object is to produce an evaporating-pan in which the steam-heating coils are so graded in size that the greatest heat may be applied where it is most needed and the coils so arranged that they may be readily and easily removed, and so that while in use everything connected with the heating apparatus may be entirely beneath the surface of the juices in process of evaporation.

The nature, construction, and operation of my improvement will be more fully understood by reference to the accompanying drawings.

My apparatus consists of a set of two pans placed side by side, one the evaporating and the other the finishing pan, although, if required, more than one evaporating-pan may be used.

In the accompanying drawings, Figure 1 is a top plan view of the evaporating and finishing pans. Fig. 2 is a side elevation of the apparatus; Fig. 3, a rear end elevation; Fig. 4, a top view of the steam-coupling in detail; Fig. 5, a cross-section of pan A, taken at the line 5 5 in Fig. 1; Fig. 6, a cross-section of pan B, taken at the line 6 6 in Fig. 1.

Like letters of reference indicate identical parts in all the figures.

In Fig. 1, A is the evaporating and B the finishing pan. The evaporating-pan A is a wooden box with the bottom copper-lined, having the back side *d* and the ends upright and at right angles to the bottom, while the front side C is inclined to the bottom at an angle

of about forty-five degrees, as shown by the dotted lines in Fig. 3. The artificial heat is furnished by means of steam-pipes placed along the bottom of the pan and having the steam-connections so arranged that no part of the heating apparatus is above the surface of the juices while in operation. During the process of evaporation whenever the juice comes into contact at the surface of the liquid with a hot metal pipe or coupling the juice at once begins to burn and cake on the metal, so that it is extremely desirable that no heated metal shall at any time during the process extend above the surface of the juices being evaporated. I therefore use only one layer of pipe along the bottom of the pan, and my external connections with the main supply-pipe are made through the end of the pan at the bottom, as shown in detail in Fig. 4.

1 is the wooden end of the pan; 2, a connection-piece extending through the wood and to which the main supply-pipe E is attached without and the heating-pipe *a* within. The end of the heating-pipe *a* is threaded and coupled with the pipe 2 by means of the threaded collar 3. This collar 3 fits up close to and is adjustable along the pipe 2, and a washer being placed within the collar it can be screwed upon the pipe *a* so as to form a perfectly steam-tight joint, and yet by a few turns of the collar the joint can be uncoupled. The exit-pipe *g* being coupled to the discharge connection-pipe in the same way, the whole system of steam-heating pipes can be removed for cleaning at a moment's notice. The steam-heating pipes are arranged in series along the bottom of the pan, as many as are required, coupled together by U-shaped couplings. Each one of these pipes is graded in size from the largest pipe *a* to the smallest *g*. By this arrangement of graded pipe I am able to furnish the greatest heat along the side of the pan, gradually decreasing in intensity as it approaches the inclined side of the pan C, where the sirup rapidly cools. The result of this is that a current is set up in the liquid from the back to the front of the pan. The effect of the boiling process is to bring to the surface the various impurities of the sirup which float on top as a scum and rapidly approach the front side of the pan. Along

this side is arranged a trough D to catch these impurities. The bottom of this trough is inclined at an angle to the ends of the trough, so as to allow sufficient fall to give the scum a proper flow, which at the lower end is drawn off through the opening O. At the bottom of the trough a small pipe *p* is inserted, leading back into the pan and provided with a strainer *s*, in order to return to the pan any sirup that may have been carried over into the trough with the scum. The green juices are poured into the pan at the steam-supply end and, coming in contact with the heated steam-pipes, at once begin to froth and foam, bringing to the top of the liquid the worst of the impurities. In order to catch these impurities and prevent them from getting into the lower part of the pan, I provide a wooden partition *P'*, extending directly across the pan from side to side. This partition is located at the end of the cover *F*, described later on. The upper part of this partition is of wood, while the lower part consists of wire mesh, so as to allow a passage for the juices and at the same time serve as a strainer to stop impurities. This wire portion rests on the steam-coils in the bottom of the pan, and the whole partition is arranged so as to be easily removed when it is desired to remove the steam-coils for cleaning. The portion of this partition which extends across the cooling side of the pan is cut away at the top, sloping down gradually to the inclined side of the pan *C*, as shown in Fig. 5, in order to allow a free passage for the scum, which would otherwise collect along the far side of the partition, as there is a current along the bottom of the pan in the direction of the arrow and along the top in a reverse direction, as well as from the heating to the cooling side of the pan.

In order to aid in the circulation of the sirup, I suspend the wooden cover *F* over the farther half of the pan, where it acts as a deflector to the froth and foam of the evaporating juices. The under surface of the cover is inclined at a slight angle to the surface of the sirup, so that the boiling of the liquid against the cover throws the scum toward the inclined side and the trough. This cover is held in place by the iron brackets *m*, which are provided with double arms fitting down over the side *d* of the pan. The cover can be arranged also so as to be adjustable lengthwise to enable the operator to incline the cover at any desired angle to the juices in the pan. By means of this adjustable deflector *F* the scum is constantly thrown toward the cooling side, where it floats over the side of the pan into the trough D, and thus in this part of the pan the sirup automatically skims itself. What scum does not flow into the trough floats across the partition *P'* into the upper part of the pan, where an operator is stationed to assist in the skimming, as, the juices being received cold, the boiling here is slight, gradually increasing up to the parti-

tion, so that the scum is carried by the current to the corner of the pan and the juice will not automatically skim itself. The finishing-pan B is in construction and arrangement of parts similar to the evaporating-pan, except that about one-third of the pan at one end is very much narrower than the balance, in order that during the final steps of the finishing process the sirup may be all brought into direct contact with the heated pipes. *C'* is the inclined side; *P''*, the partition; *D'*, the trough; *O'*, the discharge-outlet for the same; *t'*, a pipe to return juices from the trough to the pan; *s'*, a strainer on said pipe. The steam-pipes are not graded in size, as in the evaporating-pan, as the rapid formation of a current to throw off the worst of the impurities is not necessary. The steam-pipes are all of similar size, connected by the manifolds *a'* and *b'*, except the pipe *c'*, which is connected with the discharge-pipe *G'*. A deflector *F'*, similar to *F*, is also used to turn the scum toward the cooling side. The partition *P''* is placed across the entrance to the narrow end of the pan and does not extend entirely to the top of the pan, as shown in Fig. 6, so as to allow a free passage to what scum arises in this finishing end to flow back into the wider portion of the pan. This partition is constructed (as the partition of the evaporating-pan,) of wood with wire mesh at the bottom and rests on the steam-coils, and is so arranged that it can be removed easily when it is desired to remove the steam-coils.

The evaporating and finishing pans are connected by the pipe *P*, through which the sirup is drawn off into pan B when ready for the finishing process. This pipe is closed by the gate *R*, operated by the handle *u*, fulcrumed at *w*.

While in use it is often found necessary to raise one end of the evaporator-pan, so that the flow of the sirup from one pan to the other may be hastened. The bottom of the pan rests on a fixed axle *W*, which is provided with flanged rollers *N N*. These rollers rest on the cams *M M*, operated by the lever *S*, fixed to the cam-shaft *Y*. By moving the lever backward or forward the end of the pan is raised or lowered at pleasure. A latch *l*, fixed to the lever, catches in notches in the toothed sector *T*, and thus holds the pan in any desired position. In the same way the finishing-pan is lowered when it is desired to hasten the flow through that pan and out through the faucet *F*, where the finished product is drawn off.

W' is the axle; *N' N'*, the rollers; *M' M'*, the cams; *Y'*, the cam-shaft, and *S'* the lever.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An evaporating-pan provided with a connected and continuous series of steam-heating pipes decreasing uniformly in size from the inlet to the discharge pipe, so that the intensity of the heat distributed may be gradu-

ally lessened from the heating to the cooling side of the pan, substantially as and for the purpose described.

2. An evaporating-pan provided with a connected and continuous series of steam-heating pipes arranged longitudinally along the bottom of the pan, each succeeding pipe having a smaller heating-surface than the preceding one from the inlet to the discharge pipe, arranged substantially as described.

3. An evaporating-pan of greater length than breadth, having one side inclined outward, and provided with a uniformly-graded set of steam-heating pipes arranged longitudinally in a connected and continuous series along the bottom of the pan, so that the smallest heating-surface is nearest the inclined side, substantially as and for the purpose described.

4. An evaporating-pan having a removable set of steam-heating pipes arranged in a connected and continuous series and graded uniformly in size, lying in the bottom of the pan, and coupled by threaded collars with the steam supply and discharge pipes entering through the end of the pan near the bottom, substantially in the manner and for the purpose described.

5. An evaporating-pan provided with a graded set of steam-heating pipes arranged in a connected and continuous series, in combination with a partition extending from side to side across said pipes, perforated below, and having its upper edge cut away, substantially as and for the purpose described.

6. An evaporating-pan provided with a graded set of steam-heating pipes arranged in a connected and continuous series and having an outwardly-inclined side, in combination with the partition P' and trough D, substantially as and for the purpose described.

7. An evaporating-pan having a system of steam-pipes arranged in a connected and continuous series and uniformly graded in size and lying along the bottom of the pan, the supply and discharge connections being arranged and extended through the end of the pan at the bottom, so that all heated parts of the apparatus shall be beneath the surface of the juice being evaporated, substantially as and for the purpose described.

8. In an evaporating-pan, the combination, with the pan, of the axle W, rollers N N, and cams M M, connected by shaft Y and operated by the lever S, so that one end of the pan may be raised or lowered, as required, substantially as and for the purpose described.

JOHN L. BECKER.

Witnesses:

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GEORGE HEIDMAN.