

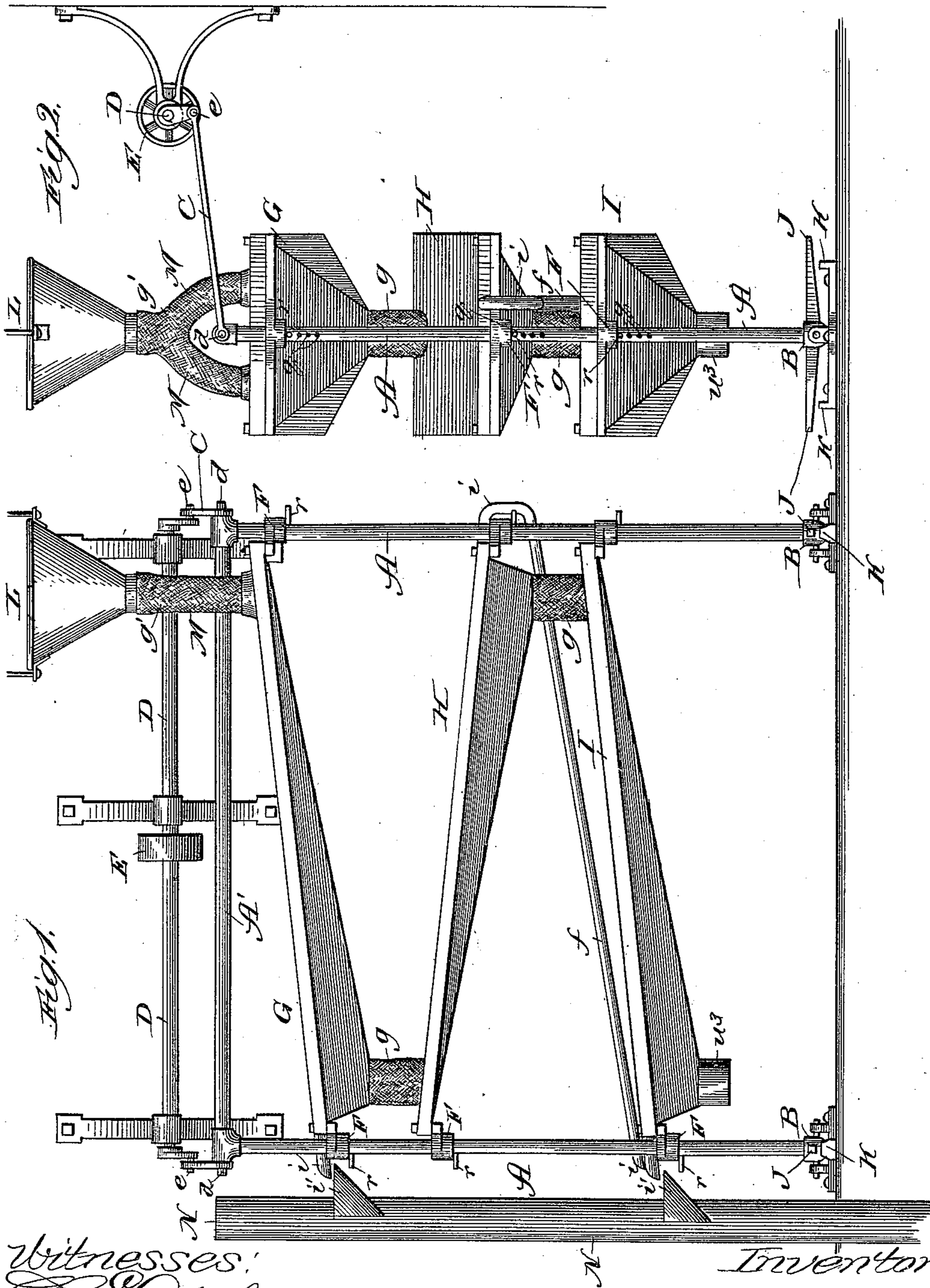
(No Model.)

3 Sheets—Sheet 1.

J. K. HALLOWELL.
CONCENTRATING APPARATUS.

No. 447,029.

Patented Feb. 24, 1891.



Witnesses:
Charles Shepard,
Clifford White.

Inventor:
John H. Hallowell,
By Deaconforth & Deaconforth,
Attorneys.

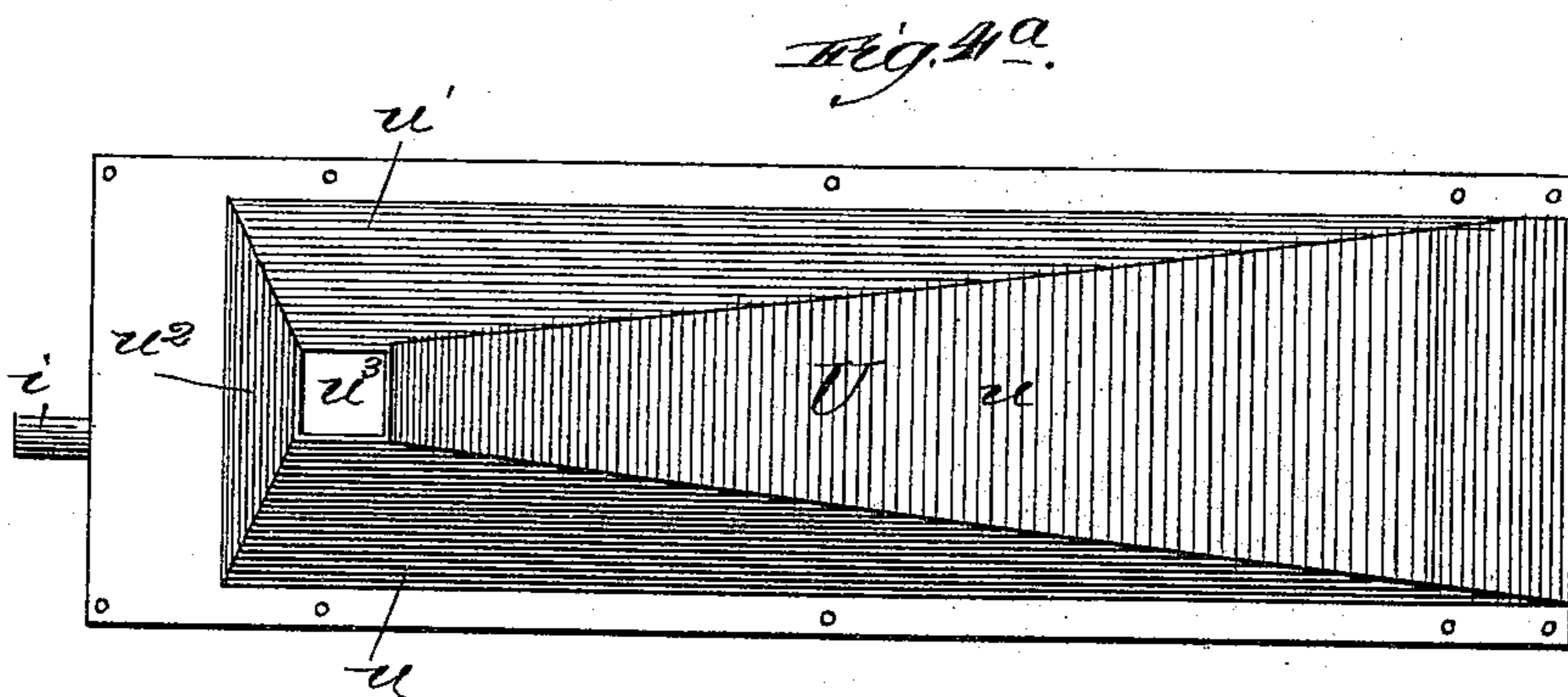
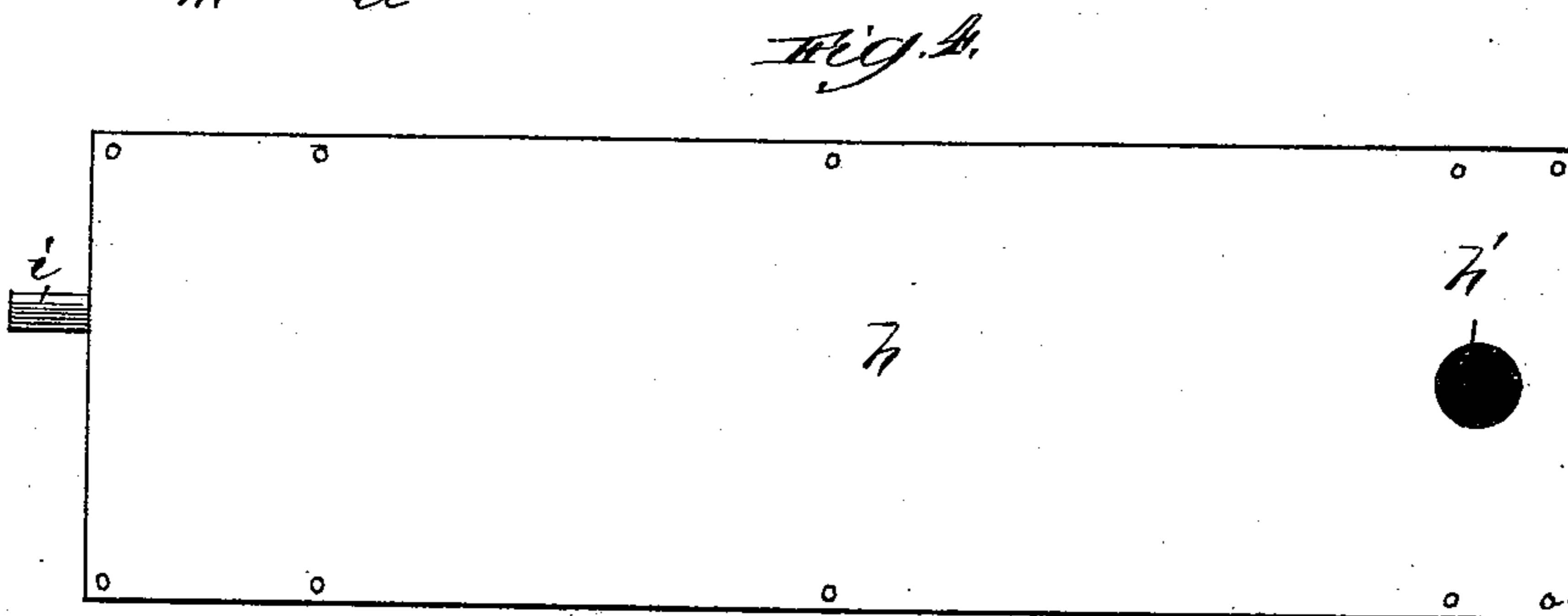
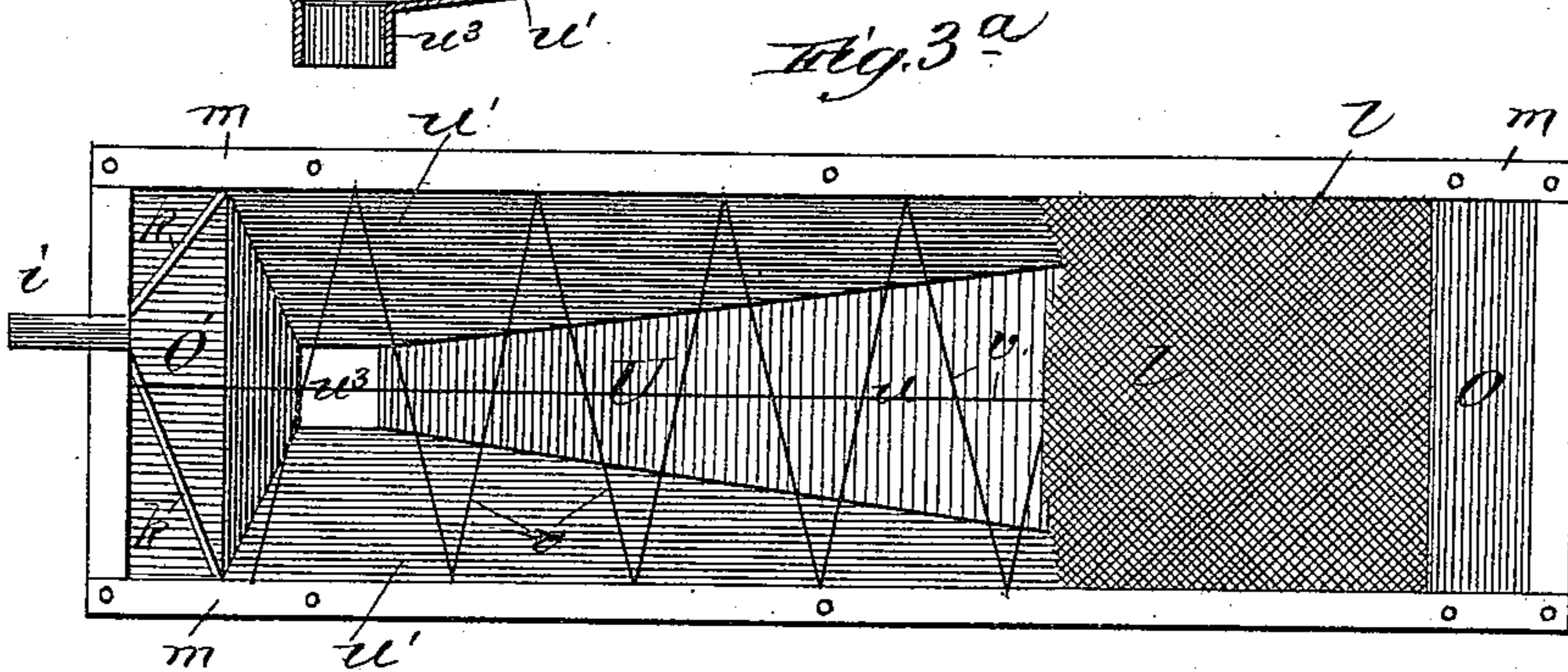
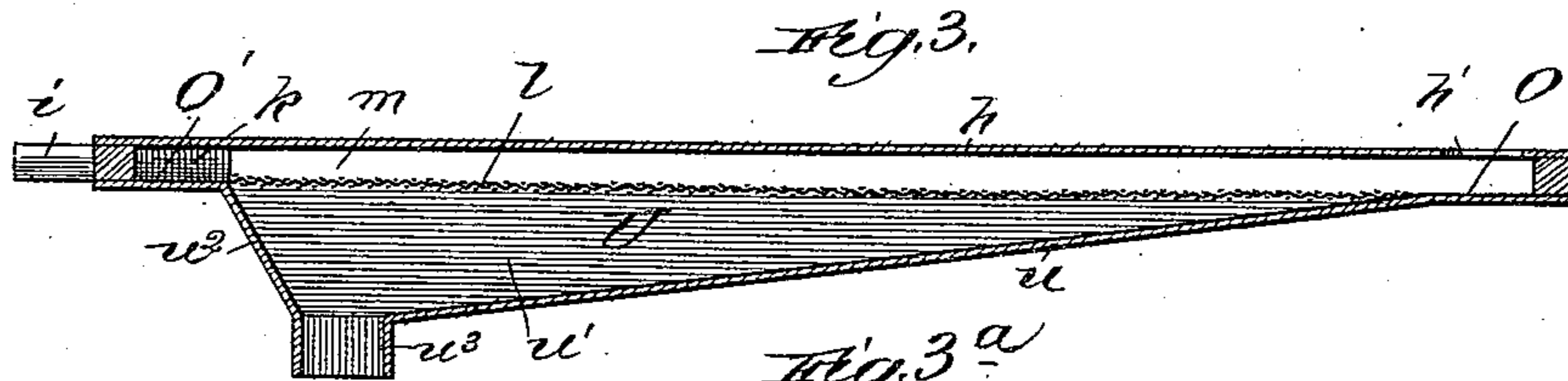
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3 Sheets—Sheet 2.

J. K. HALLOWELL.
CONCENTRATING APPARATUS.

No. 447,029.

Patented Feb. 24, 1891.



Witnesses:

Chas. E. Chubb,
Clifford M. White.

Inventor:

John H. Hallowell,
By D. S. Dyerforth,
Attys

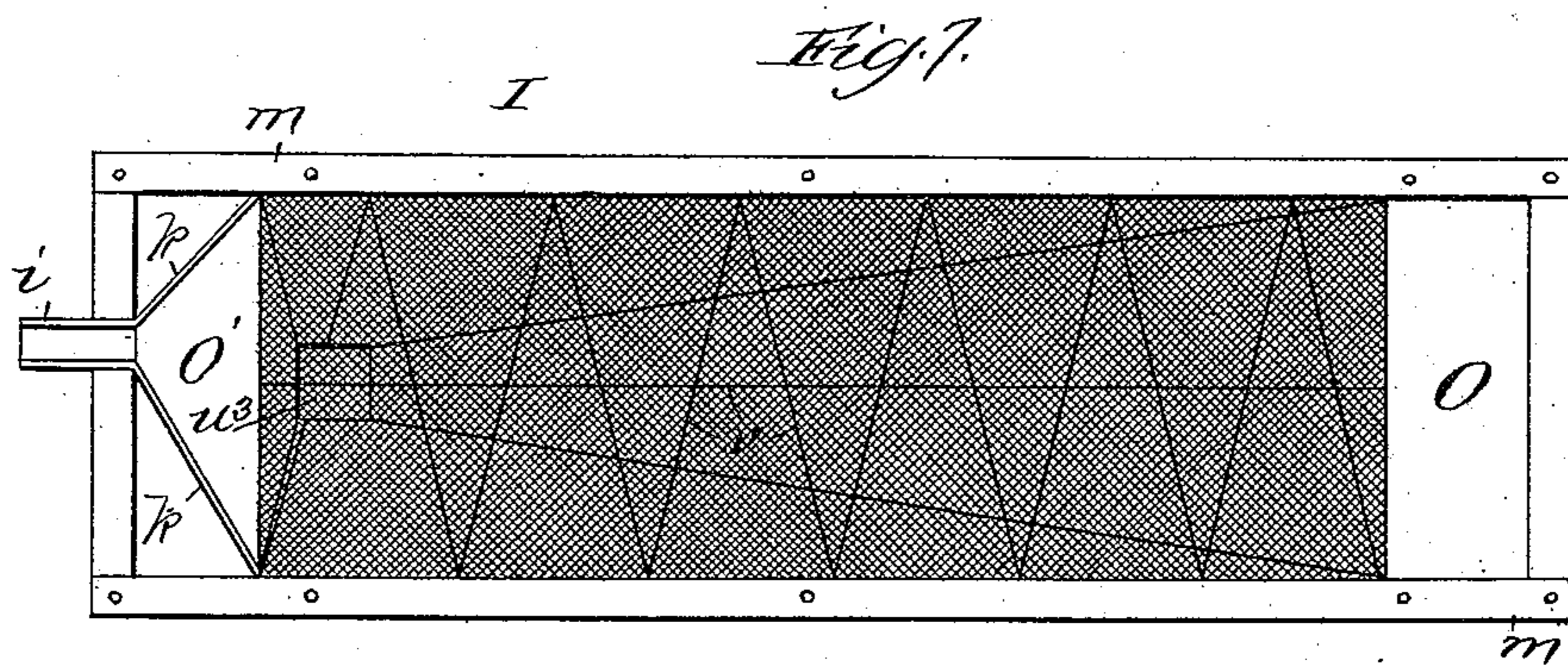
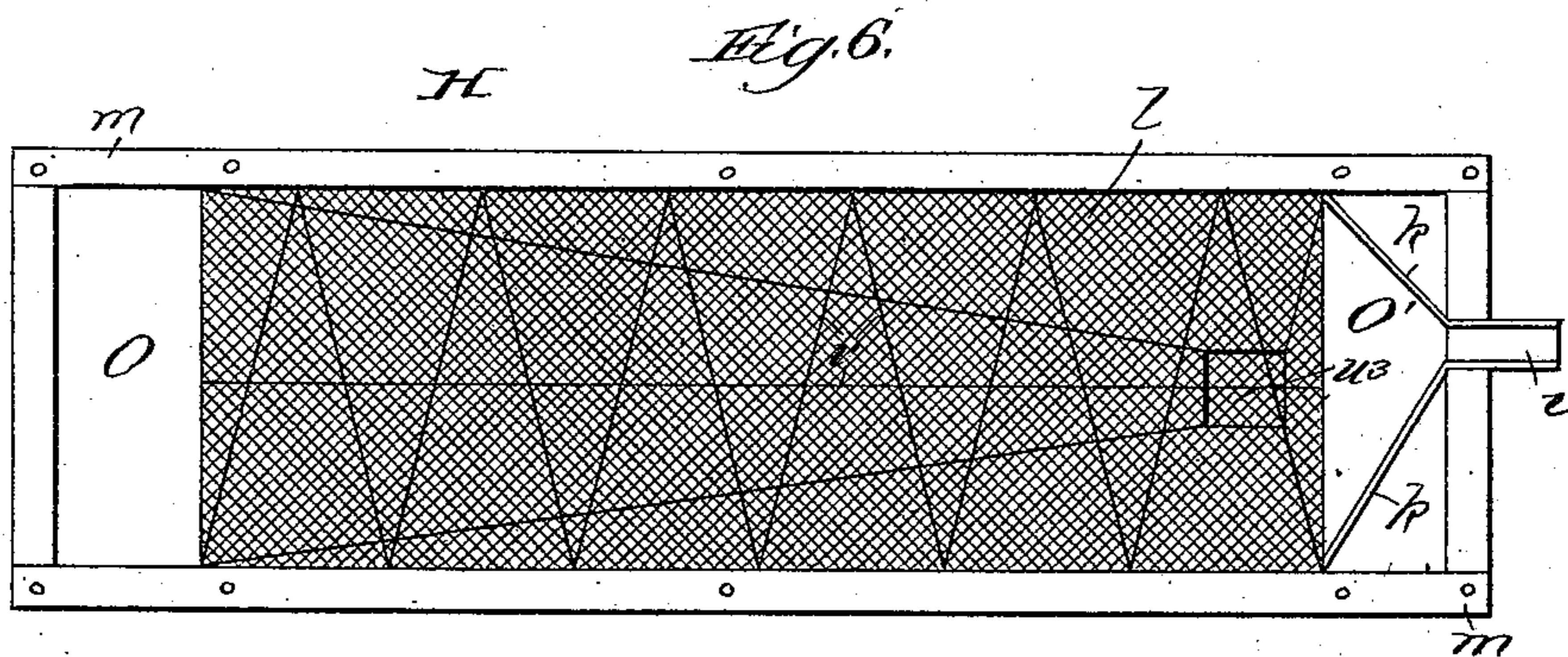
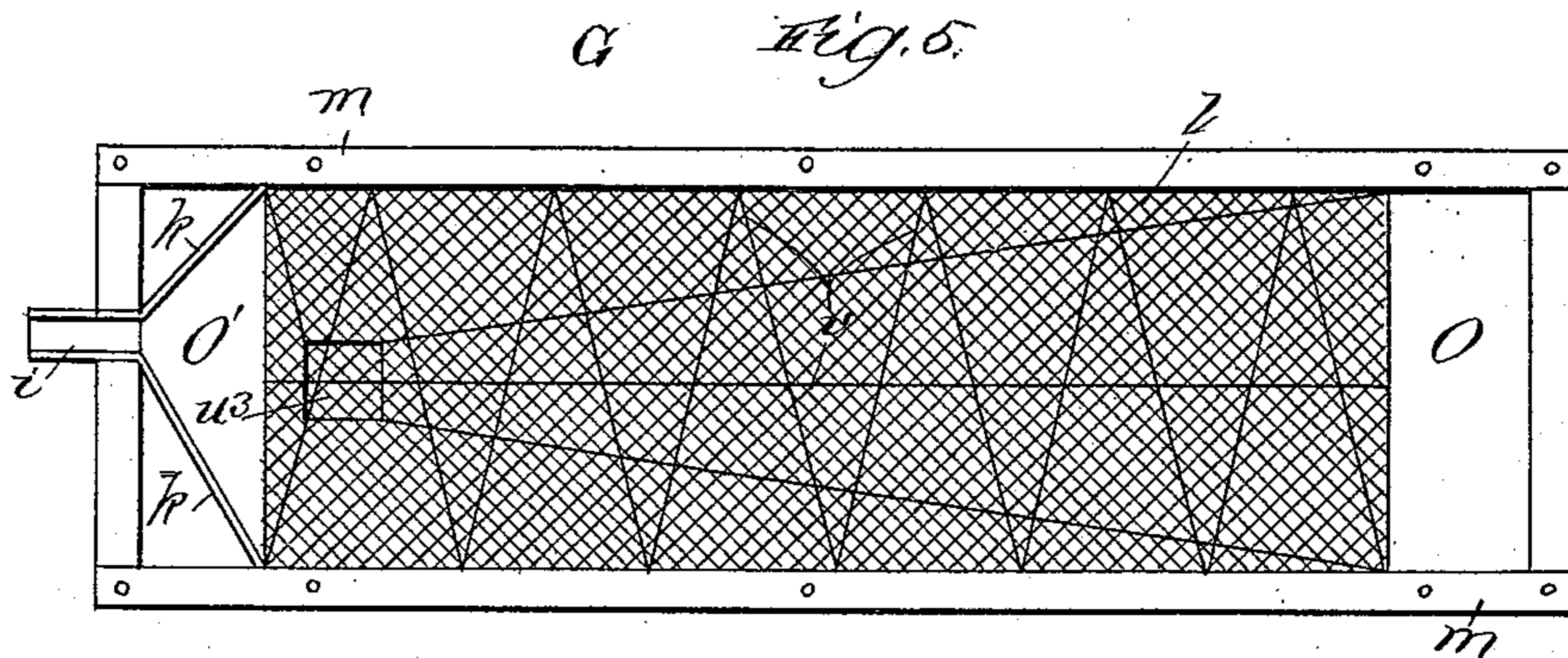
(No Model.)

3 Sheets—Sheet 3.

J. K. HALLOWELL.
CONCENTRATING APPARATUS.

No. 447,029.

Patented Feb. 24, 1891.



Witnesses:
Ed. E. Gaylord,
Clifford G. White.

Inventor:
John K. Hallowell.
By Deprenforth & Deprenforth,
Attys.

UNITED STATES PATENT OFFICE.

JOHN K. HALLOWELL, OF CAMDEN, NEW JERSEY.

CONCENTRATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 447,029, dated February 24, 1891.

Application filed June 14, 1888. Serial No. 277,132. (No model.)

To all whom it may concern:

Be it known that I, JOHN K. HALLOWELL, a citizen of the United States, and a resident of Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Concentrating Apparatus, of which the following is a specification.

My invention relates to an improvement in the class of apparatus for concentrating or "sizing" triturable material reduced to a ground or pulverized state; and it relates particularly to an improvement in apparatus of the aforesaid class whereby it shall be especially adapted to the dry concentration of the values in low-grade ores previously reduced to a proper degree of fineness.

The object of my improvement is to provide a concentrator of simple, durable, and comparatively inexpensive construction, and by means of which any desired number of sizings of which the material is susceptible may be produced by a single operation.

To these ends my invention consists in the general construction of my improved apparatus; and it also consists in details of construction and combinations of parts.

In the accompanying drawings, Figure 1 shows my improved apparatus in side elevation. Fig. 2 is an end view of the same; Fig. 3, a view in longitudinal sectional elevation of one of the several similarly-constructed screens; Fig. 3^a, a partly broken and sectional top plan view of the same, with the sheet-iron cover removed; Fig. 4, a similar view of the same with the sheet-iron top in place; Fig. 4^a, a bottom plan view of a screen-frame; and Figs. 5, 6, and 7 are plan views illustrating the different degrees of fineness of the screens.

By way of a general statement of my improvement, the apparatus and its operation may be explained as follows:

The material to be sized or concentrated is fed, in a properly comminuted condition, and preferably in a dry condition, to the uppermost of a perpendicularly disposed series of screens, the mesh of the members of which decreases in size toward the lowermost of the series, which should be of the finest mesh. The screens slant successively in opposite directions on their supporting-frame, formed with uprights, between which the screens extend,

and which are pivotally supported to enable them to be rocked to agitate the material and thereby effect its separation into the several degrees of fineness of which the comminuted mass is composed, and according to the number employed of screens of different mesh. As the material is sifted, the residue, or that of too coarse a degree of trituration to pass through a screen, is automatically discharged therefrom.

Following is a detailed description of my improved apparatus:

The frame is a light structure formed of uprights A A, preferably sections of gas-pipe, connected at their upper ends by a cross-bar A', also formed, by preference, of gas-pipe. At their lower ends the uprights A are pivotally supported in suitable bearings B. On the uprights are arms F, the number of which on each upright should correspond with the number of screens employed, and which are supported by the arms, the latter extending transversely of the uprights and being adjustable to different heights thereon, and sustainable in their adjusted positions, as by pins r, set-screws, or the like, inserted into holes q, provided in perpendicular series in each upright. At the base of each upright, on opposite sides thereof, at right angles to its pivot, are stops K, across which extend the opposite ends of an arm J, secured transversely of the upright near its base and permitted to rest against one of the said stops to prevent toppling of the frame when disconnected from the driving-shaft D, hereinafter described.

The screens may be provided in any desired number, depending upon their dimensions and degrees of inclination and the capacity (length) of the uprights to accommodate them. I show three screens G, H, and I, all of which involve the same, or substantially the same, construction. Hence a description of the construction of one will explain that of each, slight differences being pointed out where they occur.

A rectangular frame m has stretched over its under side a sheet of woven wire l, the mesh of which on the uppermost screen is largest, and becomes finer and finer in the order of location of the screens in the series in which they are supported. At one end the

frame carries on the screen a plate O, preferably of metal, and at its opposite end another plate O', having sides k , converging toward the extremity of the screen and terminating in a spout i , projecting beyond the end of the screen. Where the mesh of the screen is sufficiently fine to render its reinforcement desirable, it should be strengthened with supporting-wires v , as indicated in Fig. 3^a. On the under side of the frame and extending longitudinally between its extremities is secured the bottom U, Fig. 4^a, the base u of which is of the width of the frame at the end thereof where it is secured to it, and slants thence in a downward direction toward the opposite end of the frame, tapering laterally, as shown, to its extremity. Converging sides u' extend from the sides of the frame m to meet and conform to the tapering edges of the base u , and they are joined at their extremities by an end piece u^2 , properly conforming. At the lowest point of the junction of the parts u , u' , and u^2 is a flanged opening u^3 for the discharge of material. The base U is thus substantially synclinal in form, or trough-shaped. The upper side of the frame should be completely covered by a plate h , having an inlet-opening h' at the end provided with the plate O.

The several screens are extended one below the other between the sides of the oscillatory frame, resting at their opposite ends or otherwise flexibly adjusted on the arms F, provided on the uprights A, and which arms are so adjusted in pairs on the uprights with the members of the pairs on different planes as to cause the frame m of the uppermost screen G to slant in one direction, that of the screen H next below it to slant in the opposite direction, and that of the next lower screen I to slant with the uppermost one. If the series of screens be extended, the arrangement of their relatively slanting positions, whereby they are caused to slant successively in opposite directions, is continued. For the purposes of my description, however, the explanation of my invention may be confined to the employment of the three screens illustrated in Fig. 1, it being understood that the number may be changed (increased or even decreased) without thereby departing from my invention.

In setting the several screens the end of the uppermost provided with the discharge-opening u^3 should coincide with the end of the next lower having the opening h' in its plate h , while the opposite end of the latter having the discharge-opening u^3 coincides with the opening h' in the plate h , covering the lowermost screen. The screens are caused to intercommunicate by means of flexible (as canvas) connections g from the lower end of the screen G to the uppermost end of the screen H, and from the lowermost end of the latter to the uppermost end of the screen I.

A stand-pipe N (or any other suitable form of receptacle) is located adjacent to the stand-

ard A, beyond which the spouts i of the screens G and I project, and the spouts extend over hopper-shaped inlets i' on the stand-pipe. The screen H likewise communicates with the lowermost stand-pipe inlet i' , the communication being produced by a pipe or chute f , extending from the spout i of the middle screen to the said inlet i' .

D is a crank-shaft supported in suitable bearings above the oscillatory screen-supporting frame, and linked by connecting-rods C from the crank-pins e at its opposite ends to studs d , near opposite ends of the cross-bar A' of the frame, and on the shaft D is a driving-pulley E, to be properly geared to the driving power. (Not shown.)

A hopper L is supported (preferably by suspension, as indicated,) to coincide at its outlet with the opening h' in the covering-plate h of the screen G, and is connected therewith by a flexible (canvas) connection g' . As shown in Fig. 2, the connection is represented as bifurcated, when the opening h' should be adapted to receive both, or there may be two such openings. This feature, however, is of no material importance.

The operation is as follows: The pulverized material to be separated is fed to the hopper L, impinging on the end plate O of the screen G, where its impact does no injury, as it might if exerted against the wire mesh. During the feeding the crank-shaft D is actuated, thereby rapidly rocking the uprights A back and forth on their pivotal bases and thus also imparting to the screens an oscillatory undulating motion, which agitates the material, causing the particles sufficiently fine to pass through the mesh of the first screen to sift into the bottom U thereof in spreading over the surface by the motion and inclination of the screen. As the unsifted remnant of the material reaches the spout i it discharges into the uppermost inlet-opening i' in the stand-pipe. The sifted material is by the same action passed through the spout u^3 of the screen G upon the plate O of the next lower screen H, sifting through the finer mesh thereof and discharging the coarser remnant, or that portion which is too coarse to pass through the mesh, into the stand-pipe at its lower inlet i' , through the chute f , and discharging the sifted portion from the bottom U of the screen H, through its spout u^3 , upon the plate O of the lowest screen I, whence it is worked by the motion of the apparatus down the finer wire-mesh thereof, sifting through the latter the particles sufficiently fine to pass through it, and which discharge from the spout u^3 of the last screen as a highly-concentrated product, a suitable receptacle (not shown) being there provided to receive the discharge, the coarser remnant discharging into the lower inlet i' of the stand-pipe N. As will thus be seen, the apparatus, while utterly simple in construction, is very effective in its operation, since by a continuous action two, three, or more sizings of the same triturated material

may readily and rapidly be produced through inclosed screens, the number of which, and consequently of the sizings, may be provided according to requirement.

5 It will be noticed that inasmuch as the up-
rights A are oscillated through the arcs of
circles the greatest strain is exerted upon
the uppermost screen, owing to the greater
weight of the material fed to it and to the
10 greater extent of its motion and agitation upon
it of the material. Hence it is formed the
stronger, and the proportion of strength of
structure of the screens to the wear upon it un-
der the conditions named is observed through-
15 out the series of screens, thereby enhancing
the durability of the apparatus.

Obviously not only may the number of
screens on the single frame be increased, but
a number of the frames, each carrying any
20 desired number of screens, may be simulta-
neously actuated by linking them together
and thus connecting them all with the same
driving-shaft, thereby materially economizing
in shafting and the like in the use of my
25 apparatus for a large sizing or concentrating
plant.

What I claim as new, and desire to secure
by Letters Patent, is—

1. In a concentrating apparatus, the com-
30 bination of a rocking frame formed with up-
rights A, pivotally supported at their bases and
each provided with supporting-arms F, and
intercommunicating covered screens adapted
to discharge from their ends and supported
35 to extend one above the other lengthwise
between the uprights on the arms F, to be
rocked laterally in the planes of the arcs de-
scribed by the rocking uprights, and inclining
successively in opposite directions, substan-
40 tially as described.

2. In a concentrating apparatus, the com-
bination of a rocking frame comprising up-
rights A, pivotally supported at their bases
and connected together toward their upper
45 ends, a crank-shaft D, connected with the
frame and provided with means for connect-
ing it with the driving-power, supporting-arms
F, and stop-arms J on the uprights, stops K
at the bases of the uprights for the arms J
50 and intercommunicating inclosed screens sup-

ported to extend between the uprights on the
arms F and inclining successively in opposite
directions, substantially as described.

3. In a concentrating apparatus, the com-
bination of a rocking frame supporting 55
screens one above the other and inclining
successively in opposite directions, and each
formed with a frame *m*, having woven wire *l*
stretched upon it and provided with a sub-
stantially synclinal or trough-shaped inclined 60
bottom U, having an outlet *u*³, a plate O at
one end of the screen, and a plate O' at the
opposite end terminating in a spout *i*, and a
cover *h*, having an inlet-opening *h'*, substan-
tially as described. 65

4. A concentrating apparatus comprising,
in combination, a frame formed of uprights
A, pivotally supported at their bases and sus-
tained against falling and connected together
toward their upper ends, arms F, adjustably 70
supported on the uprights, a crank-shaft D,
connected with the said frame and provided
with means for gearing it to the driving-
power, a receptacle N, screens G H I, sup-
ported on the arms to extend lengthwise be- 75
tween the uprights, one below the other, and
inclined successively in opposite directions,
and to be rocked laterally in the plane of the
arcs described by the rocking uprights, and
each comprising a frame *m*, having woven 80
wire *l* stretched upon it, increasing in the fine-
ness of its mesh from the uppermost to the
lowermost screen, a substantially synclinal
or trough-shaped slanting bottom U, having
an outlet *u*³, a plate O at one end and a plate 85
O' at its opposite end terminating in a spout
i, leading into the said receptacle, and a cover
h, provided with an inlet-opening *h'*, flexible
conduits *g*, respectively connecting the screen
G from its outlet *u*³ with the screen H at the 90
opening *h'* in its cover and the screen H from
its outlet *u*³ with the screen I at the opening
h' in its cover, and a hopper L, flexibly con-
nected with the uppermost screen at its open-
ing *h*, the whole being constructed and ar- 95
ranged to operate substantially as described.

JOHN K. HALLOWELL.

Witnesses:

F. G. FAXON,
CHAS. W. PILE.