(No Model.) 2 Sheets—Sheet 1.

E. C. LITTLE.

CLAY DRYING AND SIFTING APPARATUS.

No. 485,636. Patented Nov. 8, 1892.

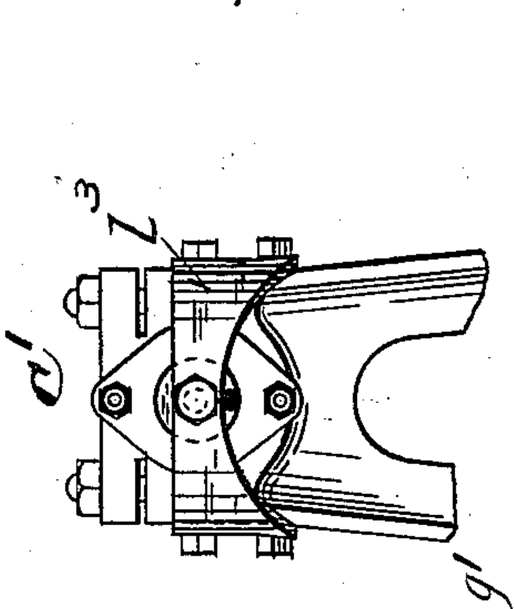

Fig. 6.

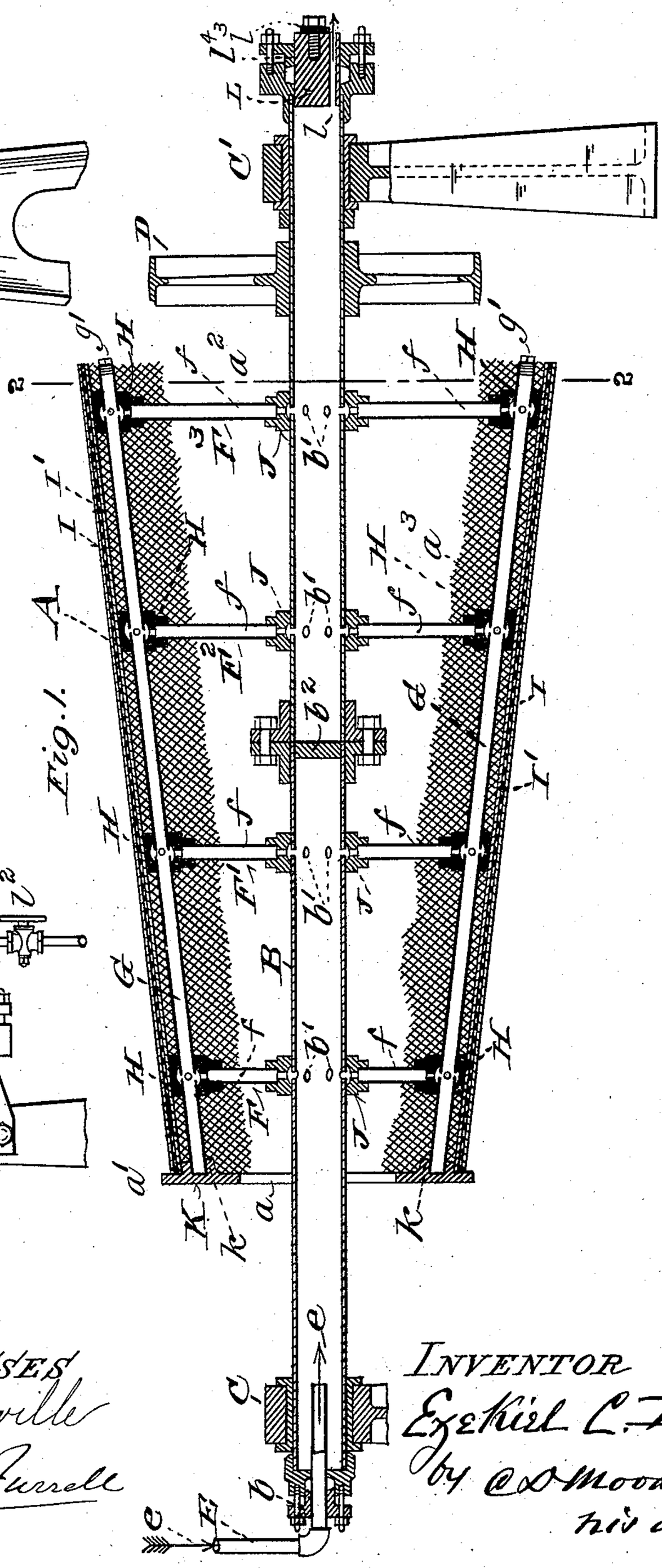

Fig. 1.

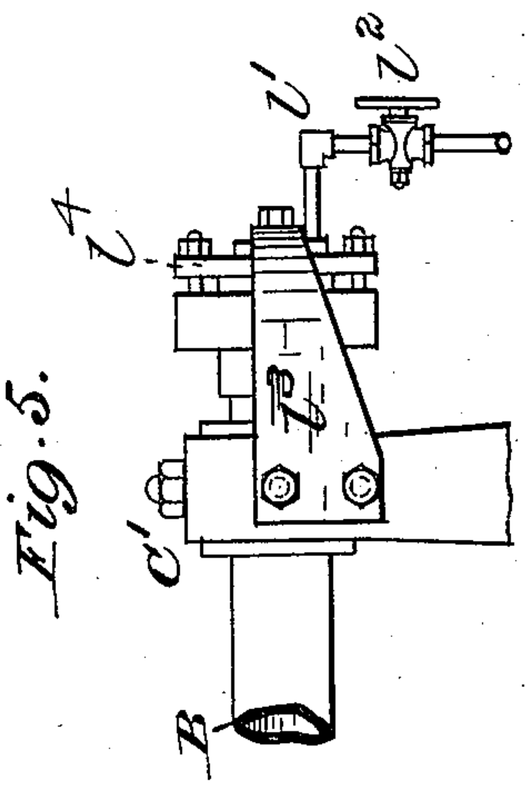

Fig. 5.

WITNESSES
A. Bonville
Edward A. Turrell

INVENTOR
Ezekiel C. Little
by C. O. Moody
his atty

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CLAY DRYING AND SIFTING APPARATUS.

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Fig. 2.

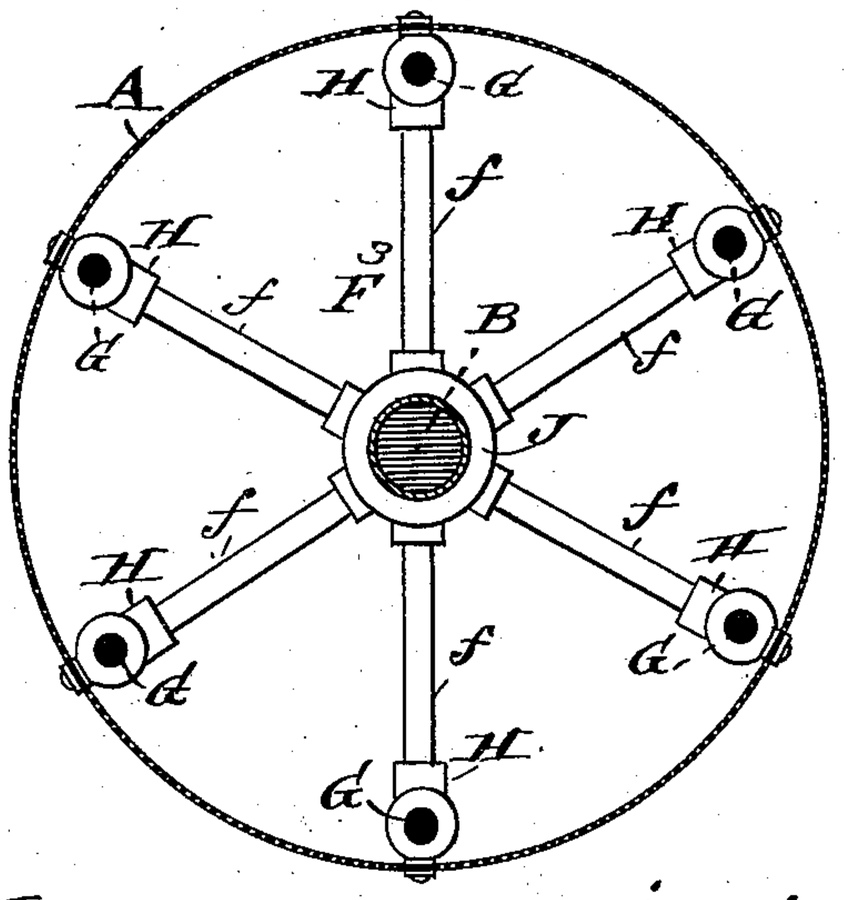


Fig. 3.

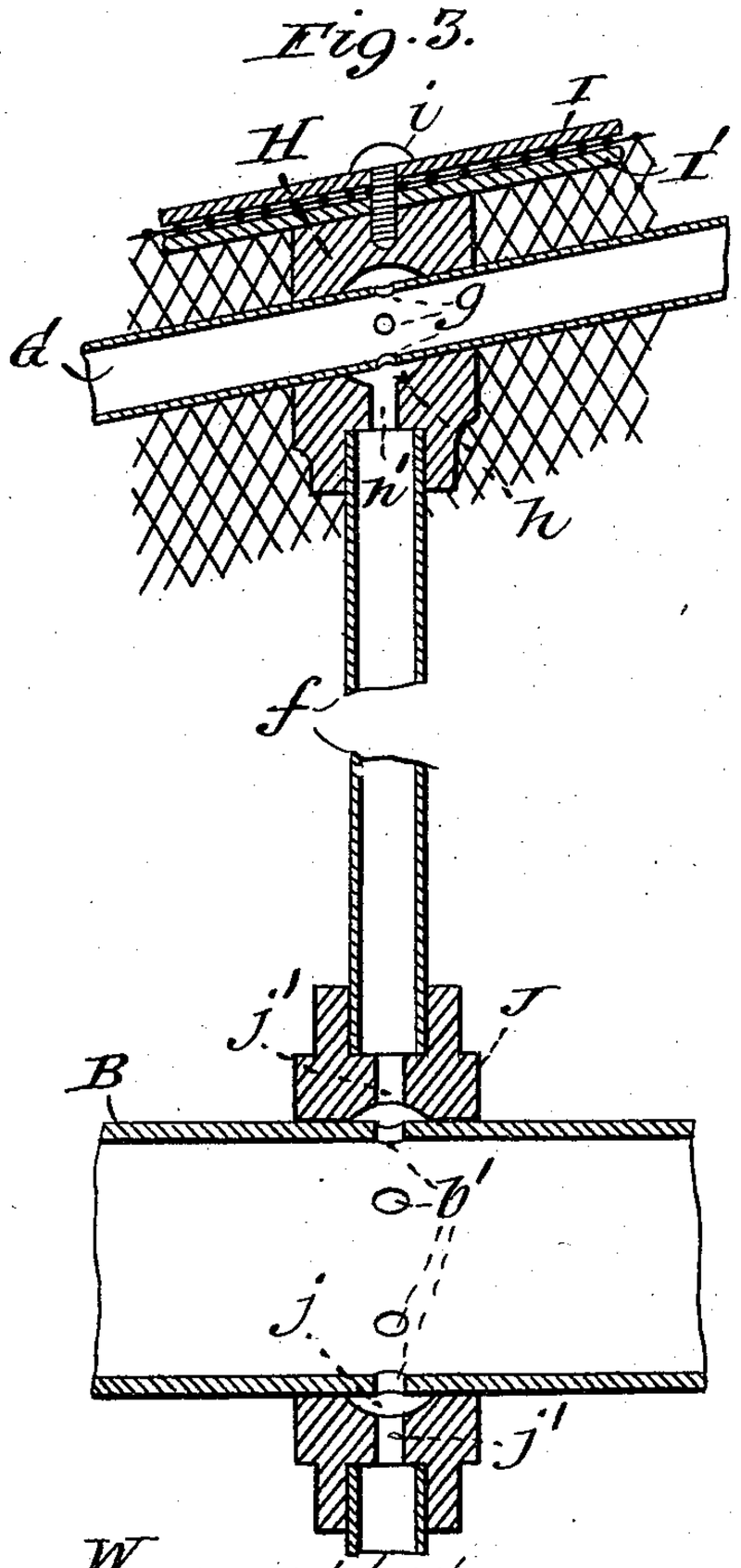
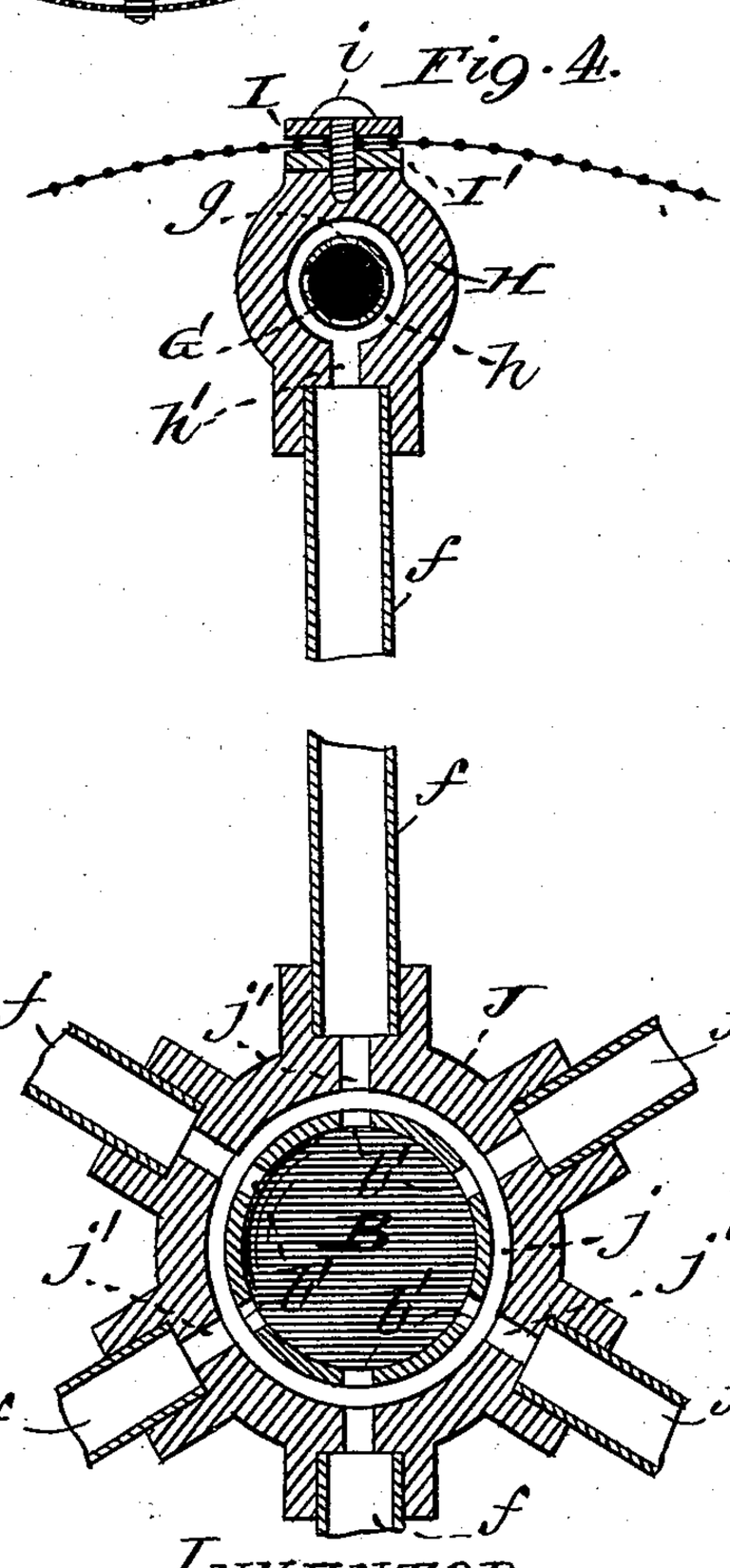


Fig. 4.



Witnesses
A. Bonville
Edward Wurrell

Inventor
Ezekiel C. Little
by C. D. Moody
his atty.

UNITED STATES PATENT OFFICE.

EZEKIEL C. LITTLE, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO MILTON F. WILLIAMS.

CLAY DRYING AND SIFTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 485,636, dated November 8, 1892.

Application filed March 27, 1891. Serial No. 386,663. (No model.)

To all whom it may concern:

Be it known that I, EZEKIEL C. LITTLE, of St. Louis, Missouri, have made a new and useful Improvement in Clay Drying and Sifting Apparatuses, of which the following is a full, clear, and exact description.

The improvement consists, mainly, in a rotatable tapering horizontally-arranged screen containing a system of tubing through which steam or other heating fluid is circulated for the purpose thereby of providing a heating-surface for the clay in its movement through the screen to come in contact with, and thereby be dried. Said tubular system is preferably the framework of the screen, and other features of the improved construction are hereinafter described.

In the annexed drawings, making part of this specification, Figure 1 is a vertical longitudinal section of the improved screen, a portion of the construction being broken away; Fig. 2, a cross-section on the line 2 2 of Fig. 1, and the remaining figures details, Fig. 3 being a longitudinal section, Fig. 4 a cross-section, Fig. 5 a side elevation of that end of the screen-shaft which projects beyond the delivery end of the screen, and Fig. 6 an end elevation of the parts shown in Fig. 5, the discharge-pipe being omitted. The last four views are upon an enlarged scale.

The same letters of reference denote the same parts.

A represents the screen. It is of suitable material and properly constructed—say of perforated metal or wirework—for the purpose in question and in shape it is a conical frustum, and it is attached to the shaft B, which in turn is journaled in suitable bearings C C′, substantially as shown. By means of a pulley D, attached to said shaft, or by any other suitable means, rotary motion can be imparted to said shaft and screen. There is a suitable opening a at the receiving end a' of the screen, through which the clay to be dried is in any suitable manner introduced into the screen, and the delivery end a^2 of the screen is also open to enable that portion of the clay which does not pass through the perforations a^3 of the screen to be discharged from the screen. The shaft B is tubular. Provision is made for introducing the steam into it as follows: E represents a pipe which leads from the steam-supply and passes through a suitable gland b in the shaft end. By means of it the steam is delivered into the shaft, as indicated by the arrows e, and in such a manner as to permit of the rotation of the shaft upon said tube.

The steam-circulation system of the screen is, as stated, preferably the framework, substantially, of the screen. It is of a shape corresponding to that of the screen, and it consists, mainly, as follows: F F′ F^2 F^3, &c., represent sets of arms f, which radiate from said shaft B and at their outer ends are connected with longitudinally-extended tubes G. The screen A surrounds the system of arms and tubes described, being secured in position, preferably, by the means shown more distinctly in Figs. 3 and 4—that is, the arms f are connected with the tubes G by means of T's H, and the screen is secured to said T's, the screen opposite the T's being held between longitudinally-extended strips I I′ and screws i, passing through said strips and interposed screen and engaging in the T's, substantially as shown; but any other equivalent means may be employed for connecting the parts described. The arms f of each set F F′, &c., are tubular. At their inner ends said arms are connected with the interior of the shaft B, and preferably in the following manner: A hub J is attached to the shaft, and at the point of said attachment there are outlets b' from said shaft. Said outlets connect with a passage j in said hub, and passages j' lead from said passage j to connect with said arms f, respectively, and said arms are suitably connected, substantially as shown, with said hub. At their outer ends said arms f are also connected with the interior of said tubes G, and preferably as follows: Said tubes G are perforated at g to form passages connecting with an annular passage h in the T, and said passage h in turn, and by means of the passage h', is connected with the interior of the arms f, substantially as shown; but any other suitable means may be adopted for connecting the interior of said shaft B *via* said arms f with the interior of said tubes G. Said framework is improved by connecting said tubes G with the ring K, which serves to

complete the structure at the receiving end of the screen. The tubes and ring are connected, preferably, by inserting the tubes at their ends in bosses *k* upon the ring. At the opposite end thereof the tubes G are closed by means of plugs *g'*. The shaft B is preferably at a point, say, midway in the length of said screen, divided by means of a cross-partition b^2.

The operation of the improved construction is as follows: Steam being admitted into the shaft B, as described, it flows through the shaft and thence into the arms *f*, thence through the tubes G, and thence through other of the arms *f* back into said shaft again—that is, while the improvement to some extent can be carried out without the use of the partition b^2 it is much more effectually carried out when the shaft B is divided, as by means of said partition, for when said partition or any other suitable means are used to prevent the steam from flowing directly through said shaft from end to end thereof the steam is necessarily caused to circulate more effectively through the tubes G and the arms *f*, as in such case the steam leaves said shaft through those arms *f* which are nearer to the receiving end of the screen, and passes thence into the adjacent portions of the tubes G. It thence flows through the more remote portions of the tubes G, and thence into those arms *f* which are nearer the delivery end of the screen, and thence the steam flows into that portion of the shaft B which is beyond said partition b^2. In this manner the screen is very thoroughly heated, and the tubes G constitute very efficient heating-surfaces for drying the clay, which is in the operation of the screen worked through the screen in the immediate vicinity of the tubes G and the outer portion of the arms *f*—that is, the clay being introduced into the screen and the screen being rotated, as described, the clay is worked along the lower portion of the screen toward the delivery end thereof, and in its movement it is stirred and agitated by means of the tubes G and other projections in the vicinity of said tubes, and the clay is thereby pulverized and dried and shaken, and the desirable portion of the clay is sifted through the perforations in the screen, and refuse is worked along and discharged at the delivery end of the screen. The water of condensation forming within the shaft B is drained therefrom through a passage *l*, formed, preferably, in a stationary plug L, which serves to close the shaft B at the farther end thereof. The water escaping through said passage may, by means of a suitable pipe *l'*, be conducted off as desired. The valve l^2 is used to close said escape when desired. The plug L is conveniently held in position by means of a stud-bolt binding said plug to an arm l^3, supported from the bearing C', substantially as shown, and a suitable gland l^4 is used to pack said plug. The improvement in a measure can be carried out with an imperforated part A—that is, in place of a screen having the perforations a^3, as shown, a rotatable chamber open at its ends only might be employed, in which case all of the clay would be discharged at the delivery end of the device.

I am aware that it is not broadly new in drying-machines to use a tubular revolving heater.

I claim—

1. A clay drying and sifting apparatus having a central and perforated tubular shaft and a tubular framework supported on and revoluble by said shaft, the hollow arms *f* of said framework connecting with the said perforations in said shaft, and a conical wire frustum-shaped screen fitting upon and over said frame and fixed thereto, said tubular frame constituting the means by which the clay is pulverized, dried, and shaken, substantially as shown and described.

2. In a clay drying and sifting apparatus, as described, the combination of the hollow shaft B, the tubular arms connected therewith, the pipes G, and the longitudinally-extended strips I I', having the wire screen between them and secured on the outside of the said pipes, substantially as set forth.

3. In an apparatus as described, the combination of a central tubular and perforated shaft having interiorly a central partition b^2 and a steam inlet and outlet, as set forth, with the hollow arms connected to said shaft and the perforated pipes secured to the outer ends of said arms, whereby an even and effectual circulation of steam throughout the entire structure is effected, all as set forth and described.

4. In an apparatus as described, the hollow arms connected at one end with the hollow perforated shaft and the other connected and combined with the hollow T's H, the frustum-shaped screen A, and the longitudinal strips I I', respectively, outside and inside of said screen and secured to and upon the outer ends of said arms, all as and for the purposes set forth.

Witness my hand this 20th day of March, 1891.

EZEKIEL C. LITTLE.

Witnesses:
C. D. MOODY,
B. F. REX.