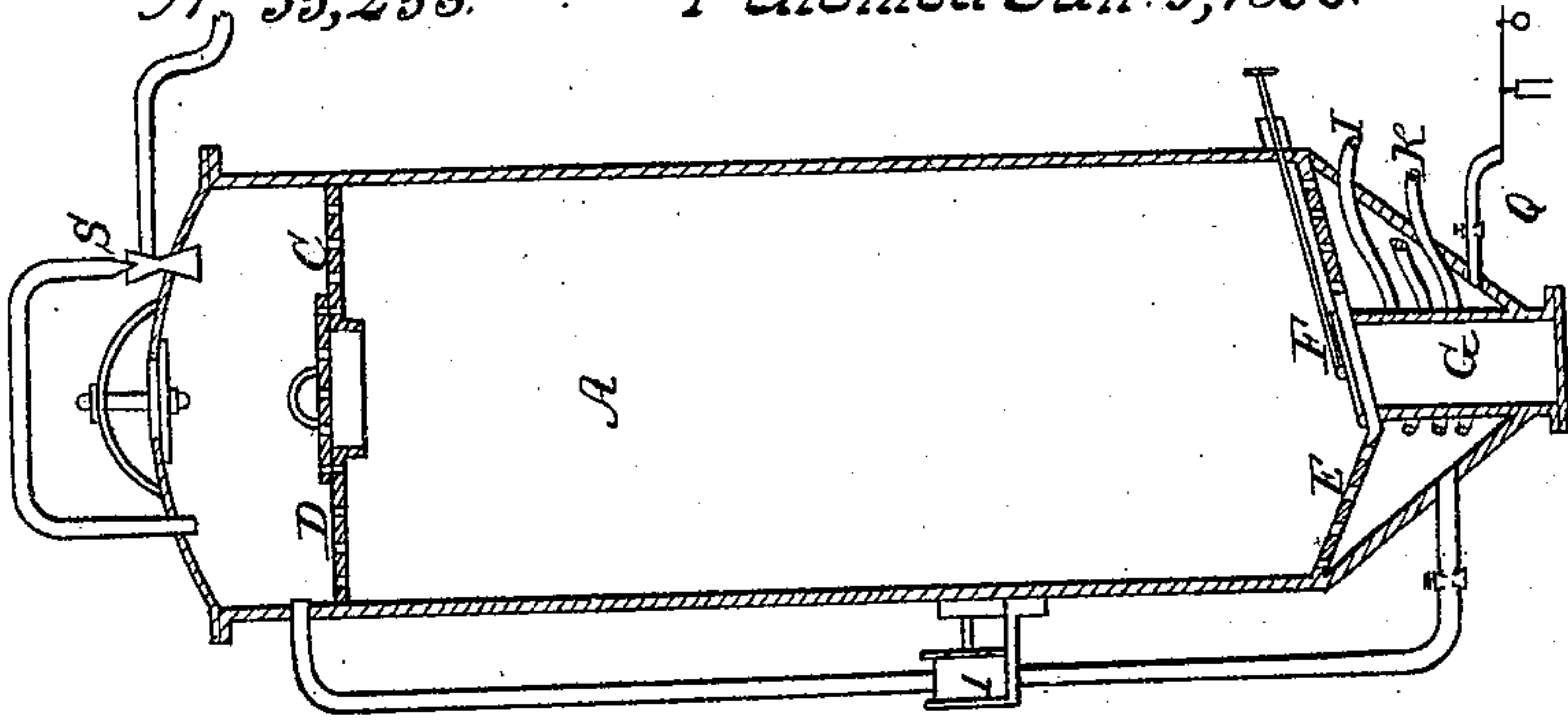


*J. W. Dixon.*  
*Paper Making Process.*

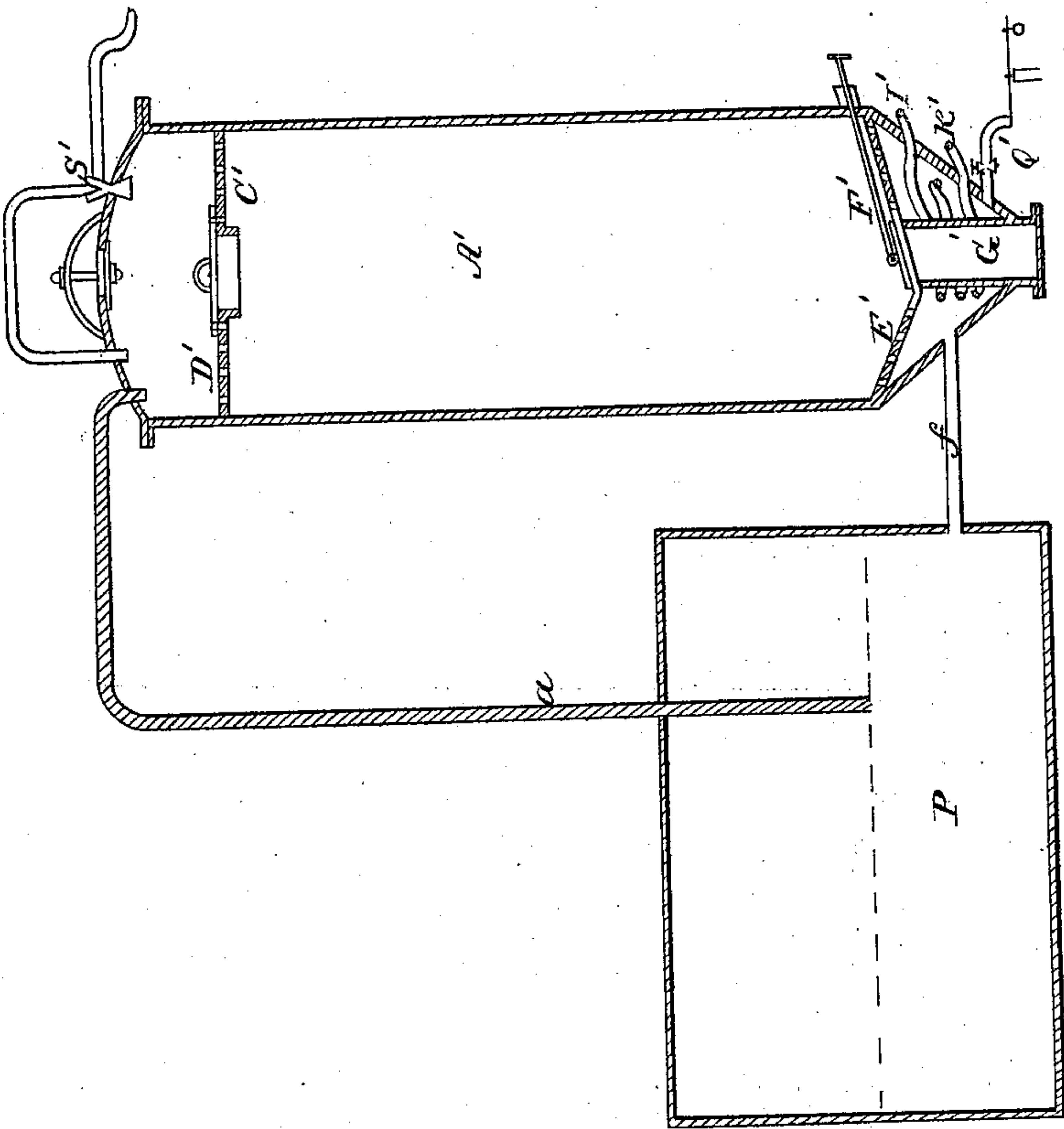
*N<sup>o</sup> 55,253.*

*Patented Jun. 5, 1866.*

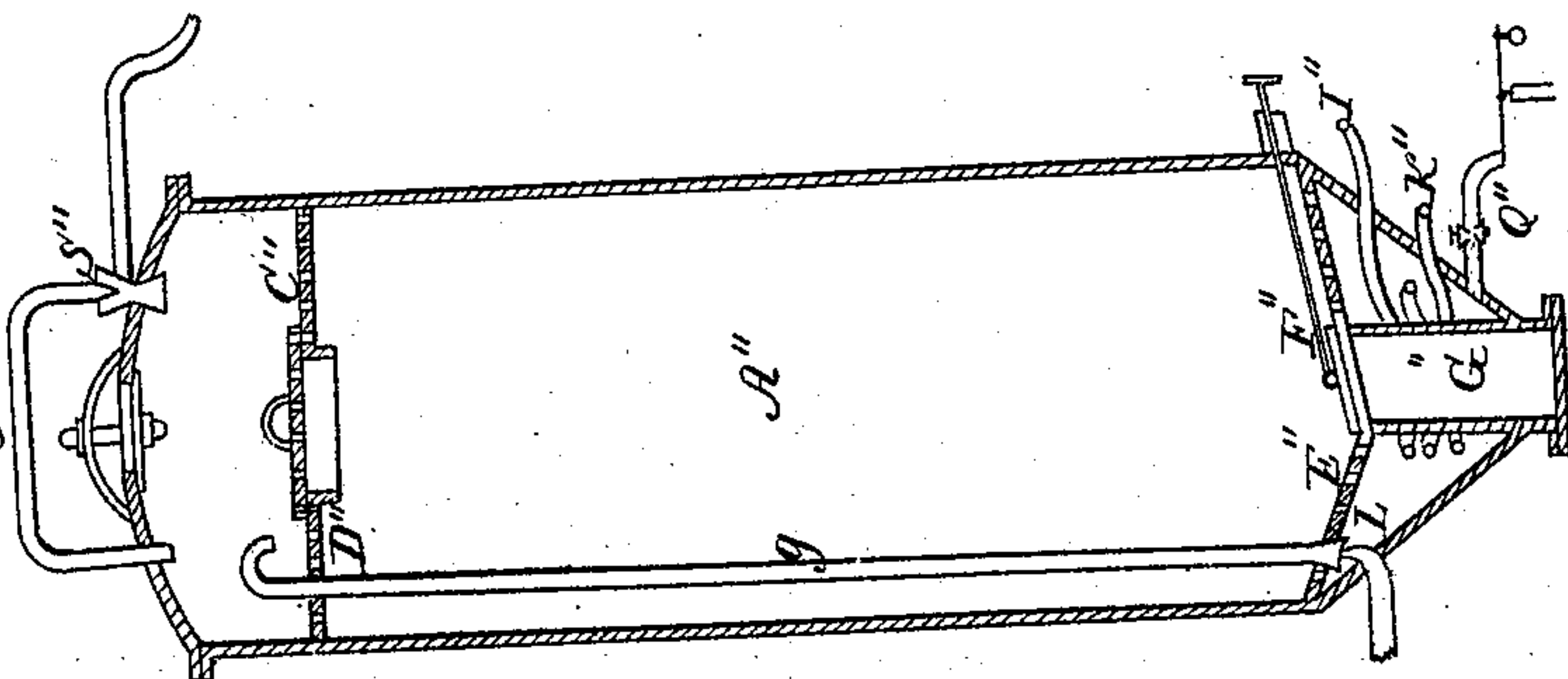
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



*Witnesses*  
*Benjamin H. Makinich*  
*Geo. Buckley*

*Inventor,*  
*John W. Dixon*

# UNITED STATES PATENT OFFICE.

JOHN W. DIXON, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVED PROCESS FOR PULPING WOOD.

Specification forming part of Letters Patent No. 55,253, dated June 5, 1866.

*To all whom it may concern:*

Be it known that I, JOHN W. DIXON, of the city of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in the Process of Pulping Wood and Woody Matter, applicable also to straw, cane, and other similar vegetable fibrous material; and I do hereby declare the following to be a full and exact description of the same, reference being had to the annexed drawings, which represent three forms of apparatus convenient for applying my improved process.

My improvement consists in circulating water containing common lime or magnesia, or a mixture of lime and magnesia in solution, highly heated and under pressure, continually through the mass of wood or woody matter to be pulped.

It is also important to force into the woody mass, either before or after the treatment with lime or magnesia water, either at intervals or continuously, a supply of fresh water to replace the gummy or resinous water simultaneously forced out by the fresh water forced in.

In applying my process, I prefer the apparatus heretofore described by me, which consists of a strong iron digester, H, capable of sustaining a pressure of about two hundred pounds to four hundred pounds per square inch. It has a man-hole on top and close-fitting cover, an upper perforated diaphragm, C, with a central opening, D, and a lower perforated diaphragm E, and central opening, F, and sliding valve covering the central passage, G, for leading off the digested mass of pulp when produced. The solution of lime or magnesia in the digester is heated by contact with a steam or hot-water coil, introduced at I and passing out at K.

I is a pump, which continually forces a circulation of the highly-heated lime or magnesia water, in a liquid state under pressure, from the bottom to the top of the digester A. At F is a Giffard injector, or fresh-water pump, placed, which forces fresh water into the digester whenever desired.

Q is the exit-pipe for the refuse water filled with gummy and resinous matter. It is covered with a weighted or safety-valve, so adjusted as to open whenever fresh water is forced in.

Instead of the foregoing, an apparatus shown in Fig. 2 may be adopted, which consists of a

digester, A, similar to that shown in Fig. 1, with its upper and lower diaphragm and heating-coil, &c., the same as in Fig. 1. P is a boiler placed over the fire, or heated otherwise, as may be most convenient. This boiler is connected to the digester by two tubes—tube *a*, which passes from the boiler up on to the top of the digester, and tube *b*, which passes across from the bottom of the digester to boiler P.

The effect of this apparatus, the principle of which is well known, is to cause a circulation of the heated lime or magnesia water up the tube *a*, and across through *b*, from the bottom of the digester, into the heating-boiler P continually.

Another manner for applying my invention is shown in Fig. 3, and consists in employing a digester under pressure, such as digester A'', Fig. 3, fitted up exactly as in Fig. 1.

From the lower part of the digester a tube, *g*, passes up above the diaphragm C''. A jet of steam is introduced from another boiler at L, below the mouth of this pipe, to force up the water, and thus establish a circulation of highly-heated lime or magnesia water under pressure. These plans are mere illustrations of alternative modes of applying my invention.

The wood or woody matter, straw, &c., having been fed into either of the digesters A or A' or A'' through the man-hole at the top, and the aperture D D' D'' in the diaphragms C C' C'' closed up, the pump F, Fig. 1, is started, to cause a circulation from bottom to top. In Fig. 2 the heating apparatus itself causes the circulation, and in Fig. 3 the jet of steam introduced at L causes the circulation. In either a circulation of highly-heated lime or magnesia water under pressure is caused from the top down through the mass of woody matter, through diaphragm E E' E'', where the water is strained from the woody matter, whence the water so strained is again forced up to the top. This rapid circulation of the highly-heated lime or magnesia water under pressure through the woody matter enables the highly-heated lime or magnesia water under pressure to dissolve and carry from the woody matter its gummy, gelatinous, and silicious matter.

In connection with the foregoing operation fresh water may be introduced, either



by an injector or pump, S, S', or S'', to the upper part of the digesters, either at intervals or continuously, before or after the lime or magnesia water treatment. The cock Q, Q', or Q'' is so loaded in each case as to open at intervals, or whenever fresh water is forced into the digester at S, S', or S''. Before the woody matter is to be withdrawn, a sufficient quantity of highly-heated water under pressure must be passed through it and drained off, so as to leave no gummy matter in it when the woody matter is discharged from the digester by opening the slide-valves F, F', or F''.

I prefer, in operating on wood, to maintain the lime or magnesia water at a pressure of one hundred and fifty pounds and upward, and the temperature due thereto, although fair results may be obtained with increased length of time at a somewhat lower pressure—say one hundred and twenty-five pounds.

I do not desire herein to claim any of the

forms of apparatus shown above, as these are merely illustrations of apparatus suitable for applying my invention.

Having thus described my invention, what I claim as new therein is—

1. The circulation of a highly-heated solution of lime in water, or of magnesia in water, or a mixture of lime-water and magnesia, under pressure through a mass of woody fibrous material contained in a digester, as a process or preparatory process for making paper-pulp.

2. The above process, in combination with a circulation of highly-heated fresh water under pressure through the immersed mass, either as a precedent or subsequent operation to the one first above claimed.

JOHN W. DIXON.

Witnesses:

GEO. BUCKLEY,

BENJ. McMAKIN, Jr.