

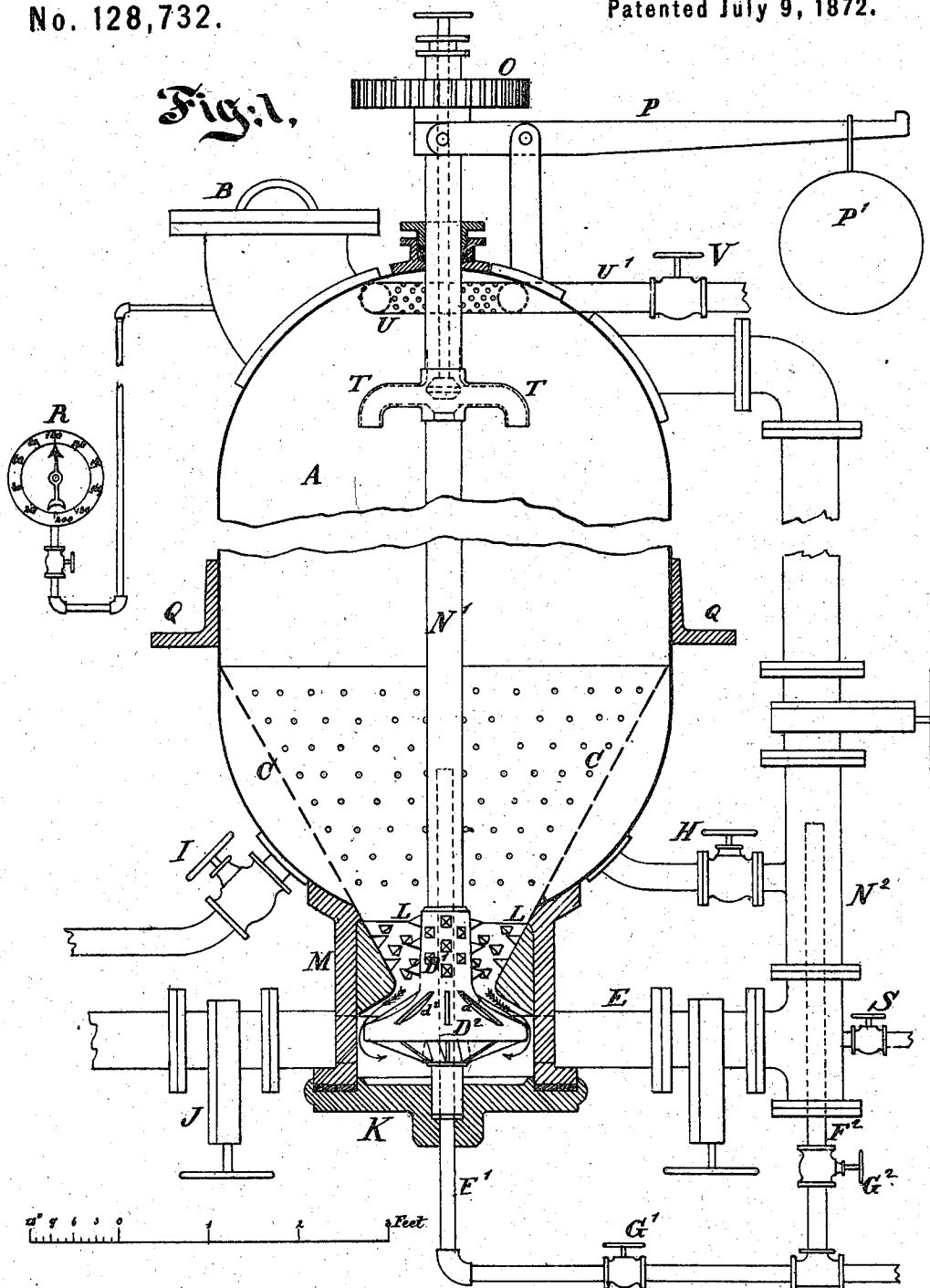
M. L. KEEN.

2 Sheets--Sheet 1.

Improvement in Apparatus for the Manufacture of Paper-Stock.

No. 128,732.

Patented July 9, 1872.



Witnesses;

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*Arnold Hornum*

Inventor;

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 by his attorney *J. S. [Signature]*

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Fig. 2.

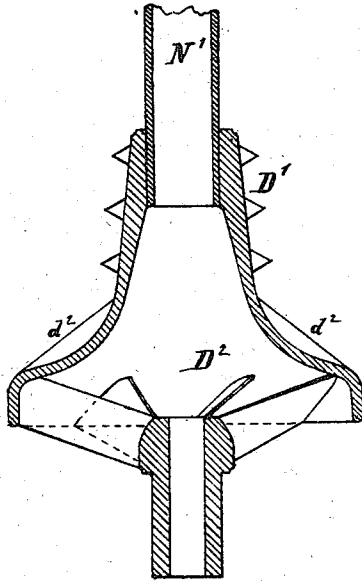
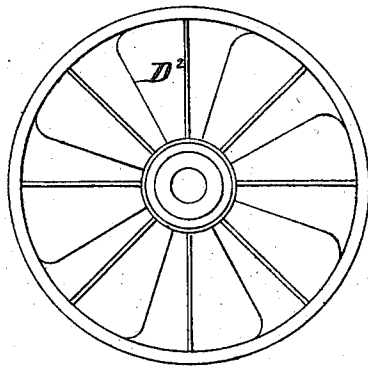


Fig. 3.

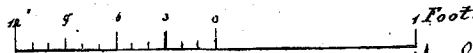


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# UNITED STATES PATENT OFFICE

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## IMPROVEMENT IN APPARATUS FOR THE MANUFACTURE OF PAPER-STOCK.

Specification forming part of Letters Patent No. 128,732, dated July 9, 1872.

Specification describing certain Improvements in Apparatus and Process for Producing Paper-Pulp and Paper-Stock, invented by MORRIS L. KEEN, of Jersey City, Hudson county, New Jersey.

The invention is applicable to the preparation of crude and fine paper stock and pulp from chips or shavings of wood, cane, and all analogous materials.

The following is a detailed description of what I consider the best means of carrying out the invention.

The boiler is of an upright form, made of iron, and electrically protected from action of interstitial matter liberated from crude materials for paper-stock during the treatment of the same in the boiler, and at the same time preserving the stock from iron-stain, as set forth in my patent of October 3, 1871, No. 119,465.

The drawing attached to this specification shows fully the form of the boiler, and the mechanical appliances connected therewith.

Figure 1 is a vertical section through the entire work at and near the top and bottom of the boiler. Fig. 2 is a central section, and Fig. 3 a view from below, showing one of the important details on a large scale.

Similar letters of reference indicate like parts in all the figures.

The boiler A is preferably about five feet in diameter and sixteen feet high, domed at top and bottom, strong enough to stand a working pressure of two hundred pounds to the square inch. B represents the charging-hole or man-head at the top of the boiler. J is a discharge-valve, where the pulp is blown out when ready. C is the conical strainer or false bottom, which acts as a funnel to guide the stock in its passage through the devil D<sup>1</sup>, and as a strainer for admitting the free circulation of fluid material, at convenience, during any stage of the treatment, and for passage of all waste and washing-fluid materials, when required, said fluids passing out through valve I. It also serves for the free admission of upward currents of steam or fluids forced in through valve and pipe H by the pipe F<sup>2</sup>, when the valves G<sup>2</sup> and V are closed. U is an annular pipe ring inserted inside of the boiler near its top, and perforated with small

holes to act as a shower-pipe for admission of steam or fluids for washing and treating the stock at different stages of the process. Said steam and fluids are forced in through outside pipe U<sup>1</sup>, communicating with and forming part of the same. D<sup>2</sup> is a centrifugal disintegrating rubber, with ridges d<sup>2</sup> on its upper face, and with suction-screw propelling-blades inserted inside of the bottom of same to draw and force the materials under treatment with the fluid matter up the hollow shaft to near the top of the boiler. I is a drain cock or valve communicating with the space under the false bottom C to drain off the interstitial and wash-water, when required; D<sup>1</sup>, a conical devil or hog, with centrifugal rubber disintegrator D<sup>2</sup> attached, firmly mounted on the end of hollow driving-shaft N<sup>1</sup>, on the inside of bottom of boiler, which may be driven in any convenient way. N<sup>1</sup> is a spew-pipe shaft on which the conical devil is set. Said hollow shaft has outlets at T, through which a complete circulation of fluids or pulpy materials is passed as they are forced up through the shaft by inside steam-injection pipe F<sup>1</sup>, after passing through the conical screen C, some of the fluid matter being passed downward and outward through the valve H; thence down further and inward through pipe E, while the pulpy matter is delivered through the conical devil D<sup>1</sup>, as marked by arrows. The whole is then passed up under and through the hollow interior of the disintegrating rubber D<sup>2</sup> by propeller-screw inside of same into the hollow shaft N<sup>1</sup>, to be spewed out at the top through the nozzles T T, and the round of operations repeated. During different stages of the process this operation is varied. G<sup>1</sup> and G<sup>2</sup> and V are stop-valves that may be closed at the time of discharging the boiler of its pulp through the valve J, or manipulated to assist in said discharge. H is a valve-opening passage through pipe E from under false bottom to space under D<sup>2</sup> in case M, to admit of the free circulation of fluid matter in the early stages of digesting the crude material; S, a sample-cock to test the condition of stock at different stages of process. O is a gear-wheel to drive the shaft N<sup>1</sup>; F<sup>1</sup> and F<sup>2</sup>, steam-injection pipes to create a current of fluid and pulpy matter, and heat the same in its passage.

As all the pulpy matter is brought in direct contact with the live steam in its passage through either the hollow pipe-shaft  $N^1$  or the outside pipe  $N^2$  it is thoroughly cooked and digested.  $M$  is the external case of conical devil and its adjuncts.  $K$  is the bottom cap and step of shaft  $N^1$ .  $L$  is the conical cup-section or shell of devil, commonly called the cup or hopper.  $P$  is a lever by which the devil, and especially its attached centrifugal disintegrator  $D^2$ , is adjusted to its work, and raised and lowered in its work by changing the position of the weight  $P'$ . It is self-acting, to yield and admit of the passage of any hard substances that might choke or injure the devil, or the rubber, or disintegrator.  $R$  is a steam-gauge, to indicate the pressure and temperature during the process.  $Q$  are brackets, to support the boiler in setting the same.

The especial object of this invention is the treatment of crude paper-stock materials, and the reduction of the same to a pulp with water, or a weak alkaline solvent, or other equivalent solvent, as set forth in my patent dated October 3, 1871, No. 119,464, thereby enabling by subsequent treatment, as washing, the removal of the gummy and acid interstitial matter to any desirable point as to its destined use in the manufacture of papers of fine or coarse qualities. If the stock is intended for coarse papers, the most of the interstitial matter may be retained and coagulated, as set forth in one of my former patents. If intended for white paper, the stock may be thoroughly washed in the boiler prior to its subsequent treatment in a solution of caustic alkali of given strength and quantities, and at such temperature and for such time as fully specified for different kinds of materials, all of which are fully set forth in former patents issued to me. The stock or pulp can now be discharged by blowing the same out of a blow-cock or discharge-valve, as mentioned, fixed in the bottom of boiler, or the stock may be blown out after the first treatment described, for the liberation of and removal of the interstitial matter. The crude pulp can afterward be washed by any suitable apparatus or means, and thoroughly prepared and cleansed for the second treatment of boiling in a solution of caustic alkali of such strength and quantity, and at such temperature for such time as the kind of stock under treatment requires for the production of any desired quality of paper-stock to be made, either into fine grades of unbleached or bleached papers. For this last-named treatment in a caustic alkaline solution, I prefer to use my patent boiler revolving on its short axis, as set forth in my patent issued July 25, 1871, No. 117,427.

I claim as my invention—

1. In a paper-pulp apparatus the conical devil  $D^1$ , and the centrifugal rubber and disintegrator  $D^2$ , arranged in connection with each other and with the lower part of the pulp-vessel or boiler  $A$ , and with a suitable circu-

lating-passage for conveying the pulp therefrom, to or near the top of the vessel, substantially as herein specified.

2. The hollow-shaft  $N^1$  extending through the boiler or vessel  $A$ , and carrying a suitable disintegrating and circulating means, so arranged as to pass the semi-fluid material downward through the disintegrating means, and upward through the hollow interior of suction-screw rubber  $D^2$  attached to the shaft  $N^1$ , and spew it out near the top of the interior of the vessel, as herein specified.

3. A pipe,  $N^2$ , forming a passage from or near the bottom of the interior of the case  $M$  at the base of the boiler, and extending therefrom upward outside of and discharging into the interior of the boiler near its top, the steam-pipe  $F^2$  entering said pipe  $N^2$  and discharging through the same, thereby forcing and heating the stock in its passage.

4. The pipe  $N^2$  and hollow-shaft pipe  $N^1$ , in combination with one another or separately, with means applied, as shown, for the proper manipulation of same.

5. The employment, in connection with a boiler or vessel,  $A$ , of the circulating-channels  $N^1$  and  $N^2$ , the rubbing and disintegrating means  $D^1$  and  $D^2$ , combined with the injection-pipes  $F^1$  and  $F^2$ , supplied with steam so as to perform the double functions of heating and aiding in the circulation of the materials, as specified.

6. The combination, as shown, of rubber disintegrator  $D^2$ , external blades or ridges  $d^2$  for centrifugal force, and internal propelling suction-screw, for the purpose specified.

7. The strainer  $C$ , connected and arranged as shown, so as to guide the stock in its passage through the devil; and also serve for admitting of the free circulation of the fluid materials at convenience during any stage of the treatment; and also for the free passage of all waste and washing fluid materials, when required, in combination with suitable controlling means adapted for separating the fluid from the solid material, and serving for the free admission of currents of steam and fluid in an upward direction, when desired, thereby inducing a circulation of either their fluid or more solid materials, or both, and transferring them again to the top of the boiler, as specified.

8. The entire boiler and connections, combined and arranged as described, adapted to be used either as a preparatory appliance in the process for making paper-stock, to be subsequently treated for white paper, or the production of crude paper-stock for the manufacture of Manilla or other wrapping-papers, as specified.

In testimony whereof I have hereunto set my hand this 17th day of February, 1872, in the presence of two subscribing witnesses.

Witnesses: MORRIS L. KEEN.

WM. C. DEY,  
THOMAS D. STETSON.