No. 650,185. Patented May 22, 1900.

J. B. F. X. MATHIEU.

APPARATUS FOR BEATING AND REFINING PULP.

(Application filed Apr. 7, 1899.)

(No Model.) 2 Sheets—Sheet 1.

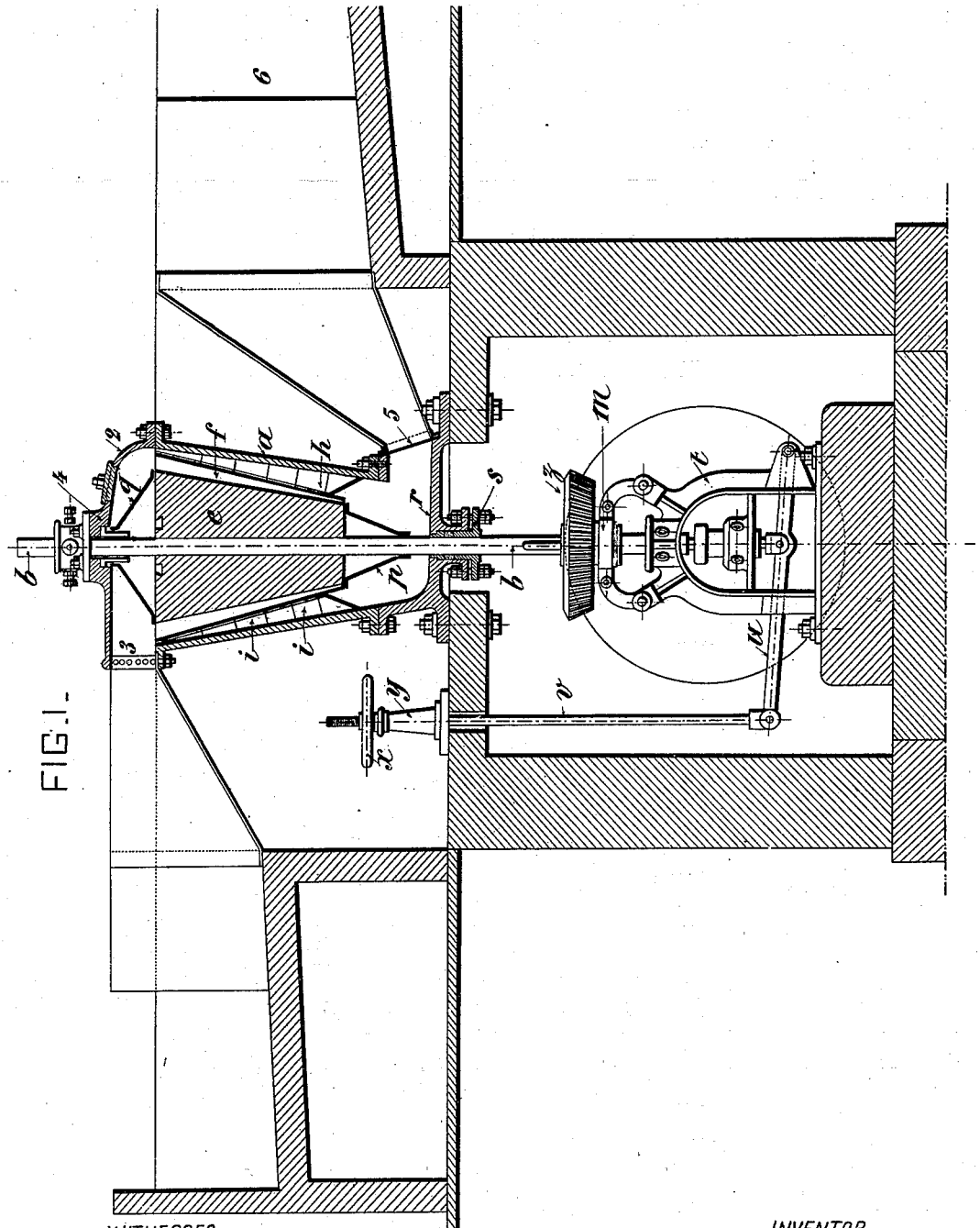


FIG. 1.

WITNESSES:

M. A. Wurtzel

G. C. Gerbel.

INVENTOR

Jean Baptiste François Xavier Mathieu

BY Howell & Haegeman

ATTORNEYS.

No. 650,185. Patented May 22, 1900.

J. B. F. X. MATHIEU.

APPARATUS FOR BEATING AND REFINING PULP.

(Application filed Apr. 7, 1899.)

(No Model.) 2 Sheets—Sheet 2.

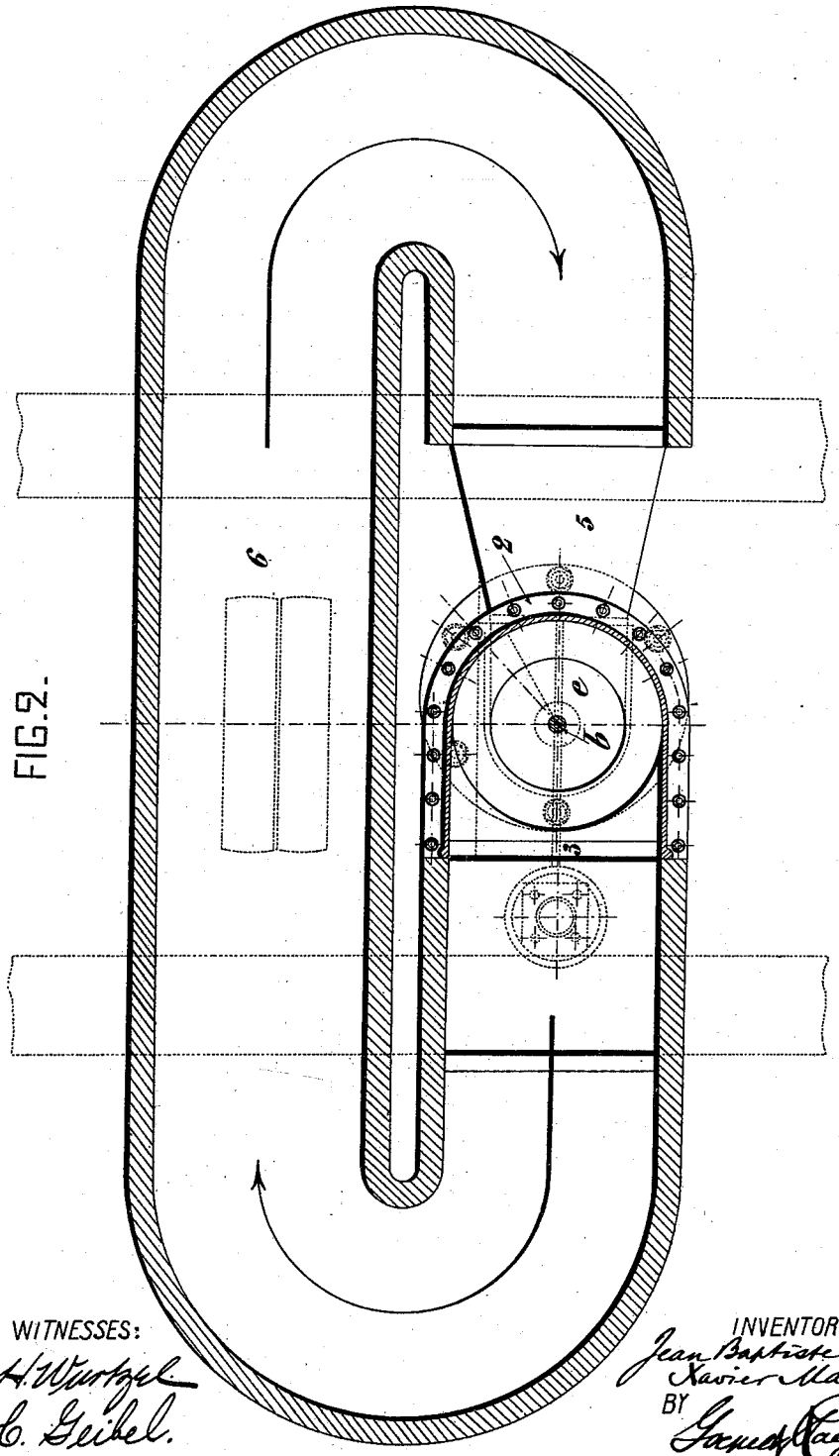


FIG. 2.

WITNESSES:

W. A. Wurtzel

G. C. Geibel.

INVENTOR

Jean Baptiste François Xavier Mathieu

BY Jarvis & Lagerquer

ATTORNEYS.

# UNITED STATES PATENT OFFICE.

JEAN BAPTISTE FRANÇOIS XAVIER MATHIEU, OF ANNONAY, FRANCE.

## APPARATUS FOR BEATING AND REFINING PULP.

SPECIFICATION forming part of Letters Patent No. 650,185, dated May 22, 1900.

Application filed April 7, 1899. Serial No. 712,057. (No model.)

*To all whom it may concern:*

Be it known that I, JEAN BAPTISTE FRANÇOIS XAVIER MATHIEU, engineer, of Pont-de-la-Pierre, les Annonay, par Boulieu, Ardéche, in the Republic of France, have invented new and useful Improvements in or Relating to Apparatus for Use in Beating or Refining Pulp for the Manufacture of Paper, which is fully set forth in the following specification.

This invention relates to an apparatus for use in beating or refining pulp for the manufacture of paper.

The invention consists of certain features of construction and combinations of parts to be hereinafter described and then claimed.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of the apparatus, taken through the diameter of the grinding-cone. Fig. 2 is a plan view of the same, parts being in section.

Similar letters and numerals of reference indicate corresponding parts.

The apparatus comprises a metallic shell *a* of frusto-conical shape, its widest end being at the upper end and its narrowest at the lower end, and a metallic hood 2, which is bolted, as shown, to the widest portion of the shell *a* and is open at one side at 3 to provide an outlet extending laterally from the shell and which is located at the upper end of the gradually and downwardly inclined circulating channel or trough 6, which terminates in a gradually-contracting and downwardly-inclined inlet-throat 5, which opens into the lower end of the conical shell *a*. All these parts form the circulating-channels of the vat A.

Inside the shell *a* is arranged a truncated grinding-cone *e*, which is mounted on a vertical shaft *b*, coincident with the axis of the shell *a*, said shaft being journaled in a bearing 4 of the hood 2 and in a bottom bearing at *r*, provided with a stuffing-box *s*.

Arranged longitudinally on the peripheral surface of the grinding-cone *e* are a series of suitably-spaced blades *f*, of steel or gun-metal, which are secured in the cone *e*, from which they project to a distance of several centimeters. On the inner surface of the truncated shell *a* is also arranged a series of blades *h*. It will be observed that while the cone *e* is concentric with the shell *a* the width of the annular space between the same is greater at the smaller end of the cone adjacent the inlet-throat 5, while it is less at the larger end of the cone adjacent the outlet 3. This arrangement and relative size permits the free entrance into the annular space of the fibers or pieces of pulp and the gradual crowding of them into and grinding them in the more contracted portions of the space, thus more thoroughly comminuting them than if the space were the same width throughout. The blades *h* of the shell *a* taper from near the inlet end to the outlet end, while the blades *f* on the cone *e* taper in the opposite direction, so that the adjacent edges of the blades *f* and *h* are not parallel with the inner surface of the shell *a* or the surface of the cone *e*, such arrangement resulting in superior grinding or cutting effects.

The cone *e*, as has been said before, is arranged vertically, with its largest diameter at its upper end. The lower portion is set in somewhat a little above the bottom of the outer shell and then ends with a decided or more tapering cone *p*. The top of the cone ends in a cone *q*, which extends up to the hood 2. The shaft *b*, before referred to, is supported and turns on a steel pivot in a bearing on an arched stand *t*, which rests on a base-plate or foundation and may be provided with regulating-screws. The raising of the truncated cone *e* is effected by means of the lever *u*, which has its fulcrum on the arched stand, the point of resistance under the middle of the arch, and the operating means at the other end. The lever *u* is operated by means of a vertical rod *v*, which is provided at its upper end with screw-thread and bearing by which it can be raised or lowered by turning its screw-threaded wheel or handle *x*, supported by the socket *y*, in one direction or the other, raising or lowering with it the lever *u* and by it the step-bearing, the vertical shaft *b*, and the truncated cone *e*.

As the shaft *b* might in its upward or downward movement carry with it its driving bevel-pinion *z*, which is splined thereon, a collar *m* in two parts is fixed onto the stand *t* by means of two lugs and engages a groove which encircles the hub of the pinion, thus preventing it from longitudinal movement whatever

be the movement of the shaft. It should be understood that the pinion is not keyed on the shaft, but only carries a set-screw.

In Fig. 2 the direction of flow of the pulp during the process of beating and refining is indicated by an arrow. After entering the apparatus at the bottom by the inlet-throat 5 it rises while it is being acted upon by the blades or conical surfaces between the two conical surfaces and passes onward through the outlet 3, to return by way of the outer channel 6 of the vat to the inlet-throat 5.

Instead of one inlet and one outlet it is to be understood that the apparatus may be provided with two outlets and two inlets. It should also be understood that the apparatus may be arranged horizontally instead of vertically without affecting the principle of the invention.

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

1. In a pulp beating and refining apparatus, the combination of a conical shell having an inlet and outlet at opposite ends, respectively, a series of blades arranged on the inner surface of the shell, an interior rotary grinding-cone coaxial therewith and provided with a series of exterior blades, the blades on the shell tapering from near the inlet to the outlet, and the blades on the cone tapering in opposite direction and the smaller ends of the cone and shell being adjacent to the inlet and the larger ends adjacent the outlet, means for rotating the cone, and means for conducting the pulp in a continuous stream to and from said shell and back through the same, substantially as set forth.

2. In a pulp beating and refining apparatus, the combination of a vertical conical shell having an inlet and outlet at opposite ends, respectively, a series of blades arranged on the inner surface of the shell, an interior rotary grinding-cone coaxial with the shell and of different conicity, said interior cone being provided with a series of exterior blades, the blades on the shell tapering from near the inlet to the outlet, and the blades on the cone tapering in opposite direction, means for rotating the cone, and means for conducting the pulp in a continuous stream to and from said shell and back through the same, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JEAN BAPTISTE FRANÇOIS XAVIER MATHIEU.

Witnesses:

M. VACHON,

FERDINAND REGIS.