(No Model.) 2 Sheets—Sheet 1.

P. A. OLIVER.

MIXER.

No. 412,783. Patented Oct. 15, 1889.

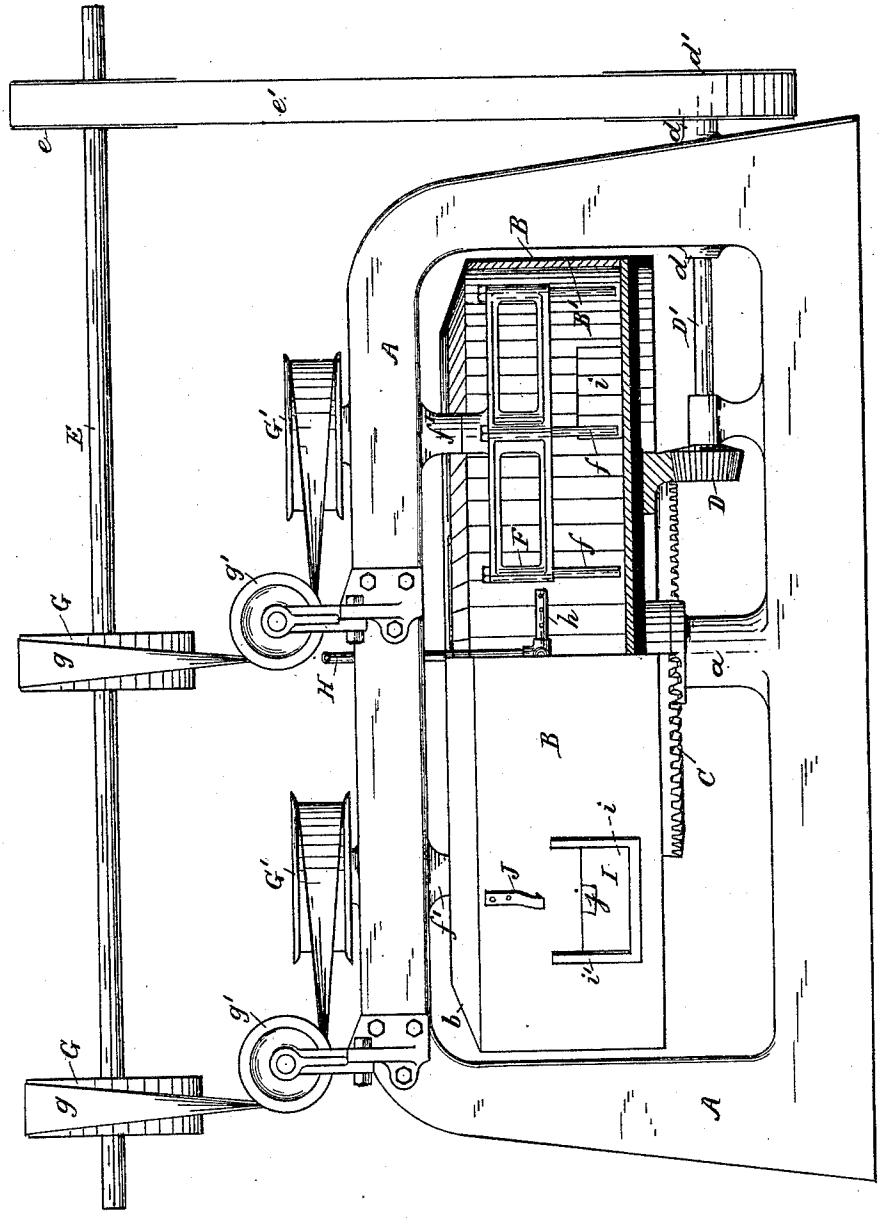

Fig. 1.

WITNESSES:

W. D. Porter.

L. B. Porter.

INVENTOR

Paul A. Oliver.

BY

Herbert W. T. Jenner.

ATTORNEY

(No Model.) 2 Sheets—Sheet 2.

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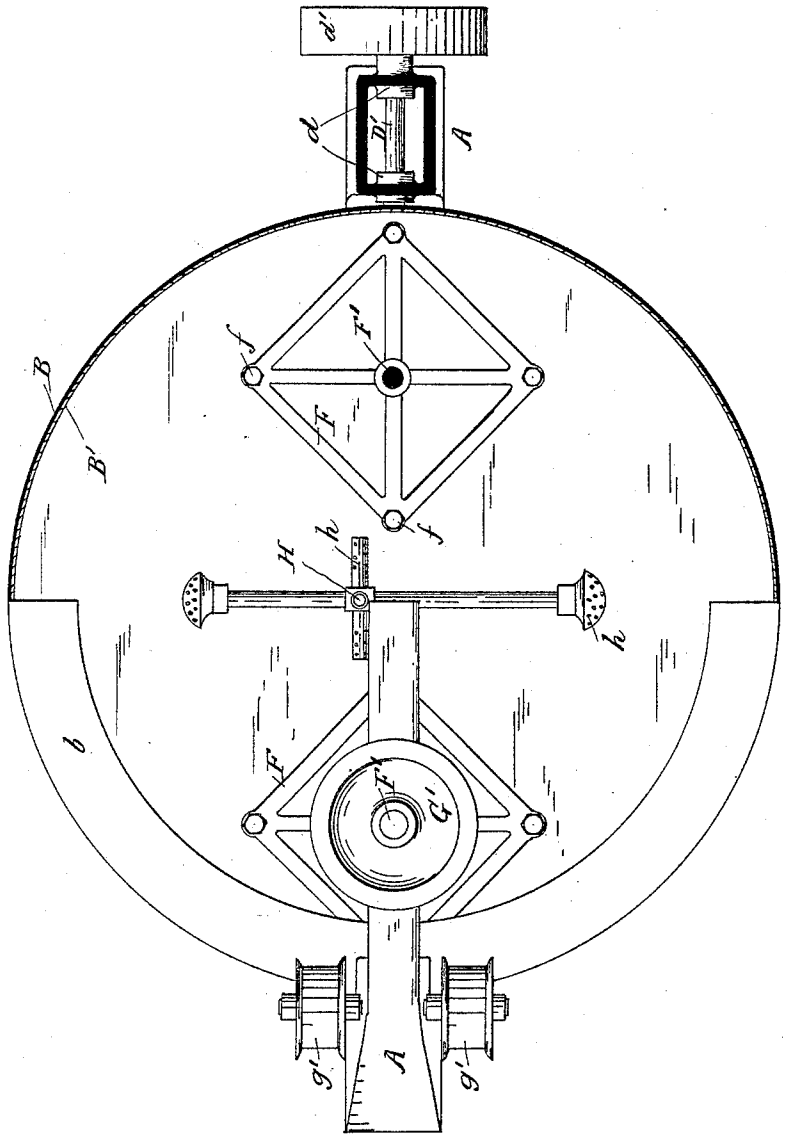

Fig. 2

WITNESSES:

W. D. Porter.

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Paul A. Oliver.

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Herbert W. J. Jenner.

ATTORNEY

UNITED STATES PATENT OFFICE.

PAUL AMBROSE OLIVER, OF OLIVER'S MILLS, PENNSYLVANIA.

MIXER.

SPECIFICATION forming part of Letters Patent No. 412,783, dated October 15, 1889.

Application filed June 18, 1888. Serial No. 277,468. (No model.)

To all whom it may concern:

Be it known that I, PAUL AMBROSE OLIVER, a citizen of the United States, residing at Oliver's Mills, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Mixers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to mixers provided with revolving agitators, similar to those used for mixing paints and other chemicals which are mixed together while in a moist condition; and it consists in the novel construction and combination of the parts, as hereinafter fully described and claimed, whereby the mixer is specially adapted for mixing together the materials used in the manufacture of gunpowder.

In the drawings, Figure 1 is a front elevation of the mixer, partly in section. Fig. 2 is a plan view of the mixer from above, also partly in section.

A is the framing of the machine, provided with a central pivot *a*.

B is the mixing-tub, which revolves upon the said pivot, and is provided with the inwardly-sloping portion *b* at the top, which prevents the contents of the tub from being thrown out.

B′ is a lining of wood or other similar soft material, which extends over the bottom and sides of the tub and prevents the materials from being fired by concussion against the metallic sides of the tub.

C is a beveled toothed wheel, cast integral with or otherwise secured to the bottom of the tub; and D is a beveled pinion gearing into the said toothed wheel and mounted upon the shaft D′, which is journaled in the bearings *d* in the frame of the machine and provided with the driving-pulley *d*′.

E is the main driving-shaft revolved by a steam-engine or any other convenient motor, and provided with the pulley *e* and belt *e*′, for communicating motion to the shaft D′.

F are the agitators, each of which consists of a square frame provided with bars *f*, which depend from the corners of the frame, and are rigidly secured to it in any convenient manner.

F′ are the agitator-spindles, which are journaled in the bearings *f*′ in the frame of the machine.

G are driving-pulleys secured on the shaft E, and G′ are belt-pulleys secured on the upper ends of the agitator-spindles. Belts *g* are provided for communicating the motion of the vertical to the horizontal pulleys, and *g*′ are guide-pulleys pivotally supported from the frame of the machine for the said belts *g* to run over.

Two agitators are used, and are arranged upon opposite sides of the axis of the tub. They are driven in the same direction at a speed of one thousand or more revolutions a minute, and the tub is revolved in a contrary direction at about one-third as fast.

H is a pipe provided with perforated branches *h*, through which water in the form of a very fine spray or in the form of steam is brought in contact with the contents of the tub.

I is a door in the side of the tub for covering the outlet *i*. More than one of these outlets may be provided, if desired. The door slides in guides *i*′, and is held down by its own weight.

J is a spring-catch secured to the side of the tub above the door, and which engages automatically with the lug *j* on the door when the latter is pushed up.

The materials of which the gunpowder is made are thrown in at the top of the tub and the machine is set in motion. The said inflammable materials are moistened by the water from the perforated pipes, and are repeatedly brought under the action of the agitators by the revolving tub. The whole mass is thus thoroughly mixed. The object of the high speed is to throw the materials against each other with such violence as to reduce them to an impalpable powder and intermix their particles by attrition at the same time. The wooden lining of the tub and the fine spray of water prevent the materials from being exploded. The agitators are driven by belts to avoid the noise and the danger from concussion which would be experienced if toothed gearing were used. The use of two

agitators arranged equidistant upon opposite sides of the axis of the tub and revolving in the same direction with equal velocity prevents the materials from accumulating at any part of the tub, so as to destroy its balance upon the central pivot, and the revolution of the said tub in a contrary direction from the agitators places a fresh mass constantly under them and insures a thorough and complete admixture of all the materials thrown into the tub.

After the materials are mixed one of the outlet-doors is opened and the motion of the machine is continued. The materials are then discharged by centrifugal force, combined with the action of the two agitators.

What I claim is—

1. In a gunpowder-mixer, the combination, with a rapidly-revolving tub balanced upon a central pivot, of two agitators revolving rapidly in a contrary direction to the tub and arranged upon opposite sides of its central axis.

2. In a gunpowder-mixer, the combination, with a rapidly-revolving tub balanced upon a central pivot, of two agitators revolving rapidly with equal velocity in a contrary direction to the tub and arranged equidistant from and upon opposite sides of its central axis.

3. In a gunpowder-mixer, the combination, with a rapidly-revolving tub balanced upon a central pivot, of a soft non-metallic lining for the tub and two agitators revolving rapidly in a contrary direction to the tub upon opposite sides of its central axis.

4. In a gunpowder-mixer, the combination, with a rapidly-revolving tub balanced upon a central pivot, of two agitators revolving rapidly in a contrary direction to the tub, and a spray-pipe for moistening the materials in the tub.

5. In a gunpowder-mixer, the combination, with a rapidly-revolving tub balanced upon a central pivot and provided with a discharge-opening in its side and a door for closing said opening, of two agitators revolving rapidly in a contrary direction to the tub upon opposite sides of its axis, whereby the materials are discharged when said door is opened, substantially as set forth.

6. In a gunpowder-mixer, the combination, with a rapidly-revolving open-top tub having an inwardly-sloping portion around its top edge, of two agitators consisting of frames provided with depending bars and revolving rapidly in a contrary direction to the tub upon opposite sides of its axis.

7. In a gunpowder-mixer, the combination of the framing provided with a central pivot, the mixing-tub mounted on said pivot and provided with mechanism for revolving it, the agitators inside the tub, provided with vertical spindles journaled in the frame, the driving-pulleys secured upon said spindles, the guide-pulleys supported by the frame, and the main driving-shaft provided with belt-pulleys for communicating rotary motion to the tub-driving mechanism and to the agitators, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

PAUL AMBROSE OLIVER.

Witnesses:
W. L. RAEDER,
BYRON B. WINCHESTER.