(No Model.) 2 Sheets—Sheet 1.

P. A. OLIVER.

GUNPOWDER MILL.

No. 382,825. Patented May 15, 1888.

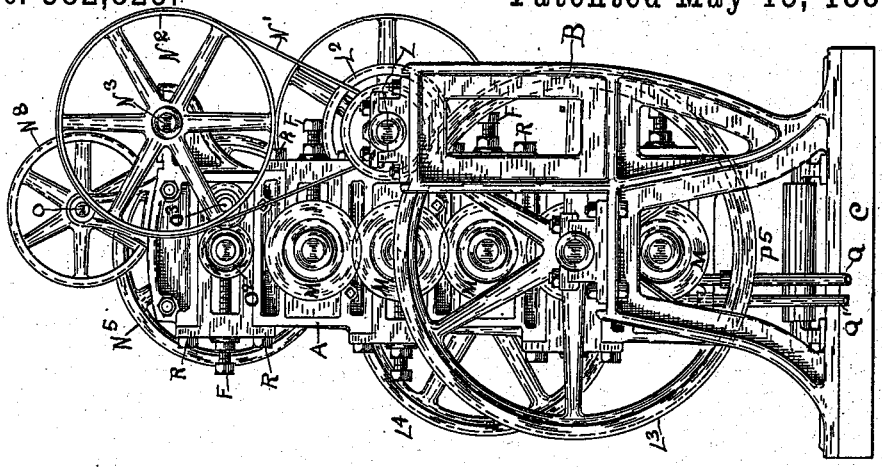

Fig. 1.

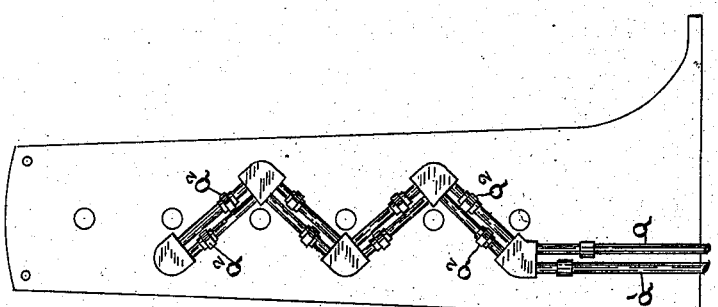

Fig. 3.

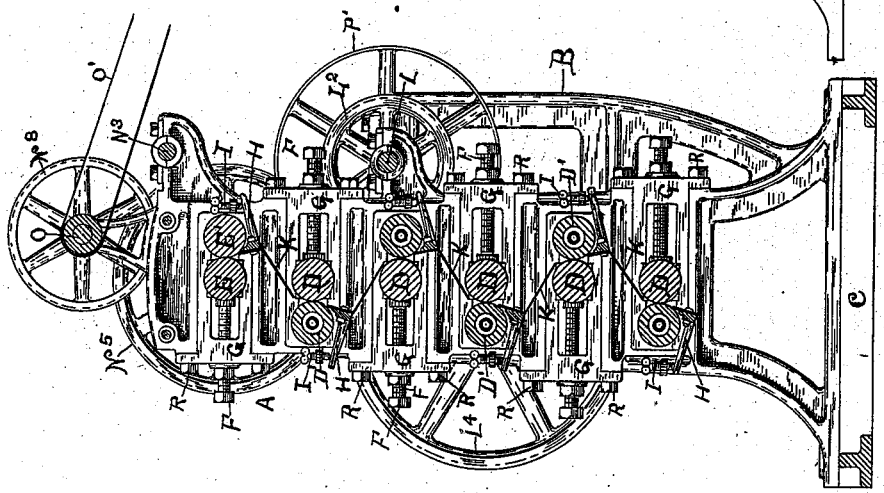

Fig. 2.

WITNESSES:

Geo. Gunty

W. D. Porter.

INVENTOR.

Paul A. Oliver.

BY

Herbert W. T. Jenner.

ATTORNEY.

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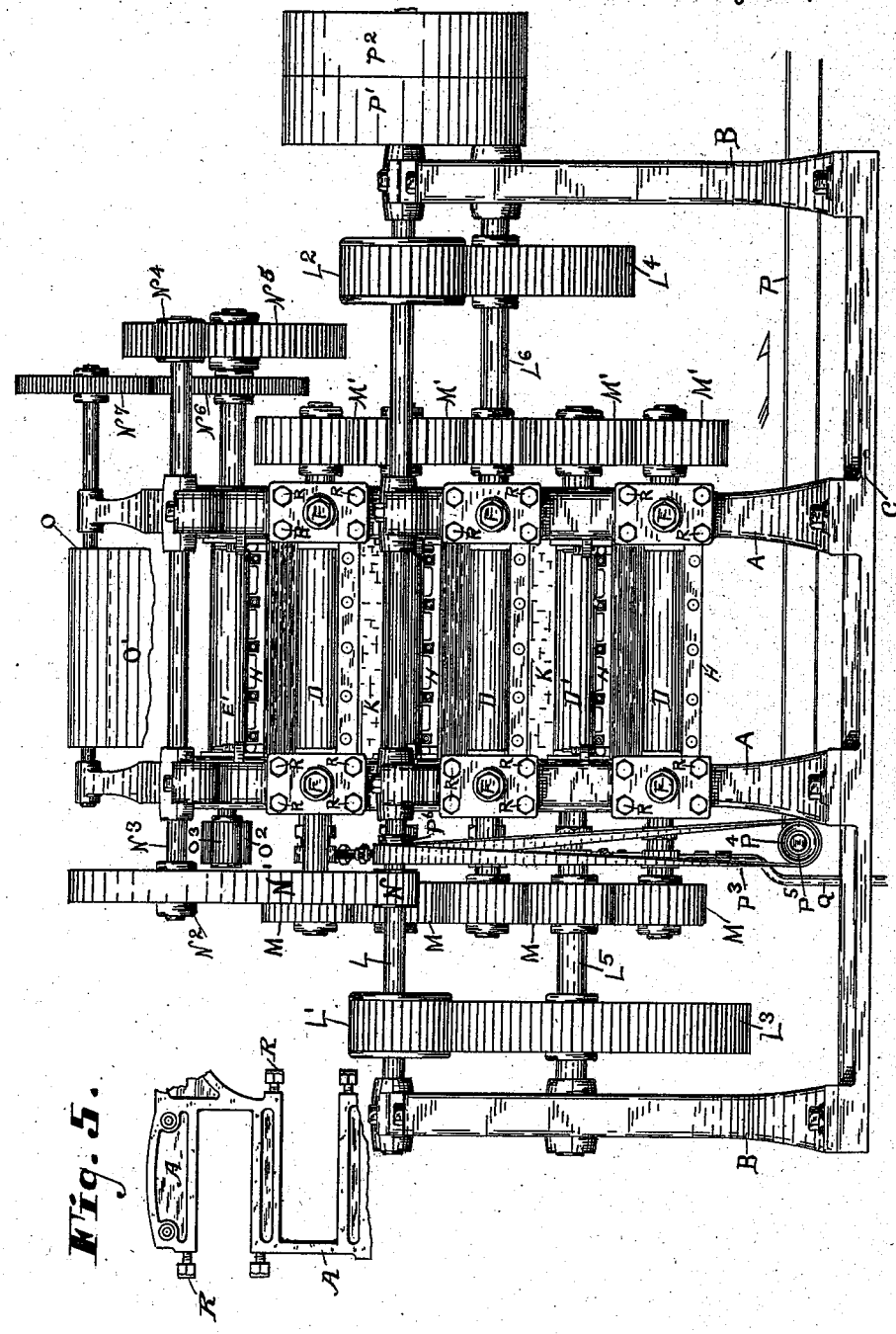

Fig. 4.

Fig. 5.

WITNESSES:

Geo. Gunty

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UNITED STATES PATENT OFFICE.

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

GUNPOWDER-MILL.

SPECIFICATION forming part of Letters Patent No. 382,825, dated May 15, 1888.

Application filed June 14, 1887. Serial No. 241,269. (No model.)

To all whom it may concern:

Be it known that I, PAUL A. 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 Gunpowder-Mills; 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 mills or machines specially adapted for manufacturing gunpowder of the class shown in the Letters Patent issued to me, No. 76,510, dated April 7, 1868, and Reissue No. 3,209, dated November 24, 1868.

This invention consists in the novel construction and combination of the parts, hereinafter fully described and claimed.

In the drawings, Figure 1 is an end elevation of the machine. Fig. 2 is a vertical cross-section through the machine. Fig. 3 is an elevation of the end shown in Fig. 1, with the gearing removed to show the circulating-pipe connections. Fig. 4 is a side elevation of the complete machine. Fig. 5 is a detail end view of a portion of a side frame.

A are the side frames, and B are outer frames for carrying the ends of the driving-shafts.

C is the base-plate, to which the frames are bolted. The side frames, A, have deep slots in them, in which are slid the subordinate frames G. R are bolts which secure the subordinate frames in position in the side frames.

Two rolls, D and D′, are journaled in each of the subordinate frames G, except the top one, which has the distributing-rollers E E′ instead. Each roll D and the roller E are made adjustable and journaled in boxes sliding in long slots in the subordinate frames.

F are adjusting-screws for regulating the position of the sliding boxes. Each roll D′ is made hollow, and has cold water circulated through it by means of the inlet and outlet pipes Q Q′, which are connected with the series of rolls, as shown, and provided with union-joints Q^2. The construction of these hollow rolls D′ is more clearly described in a separate application for Letters Patent filed of even date herewith, Serial No. 241,267. The rolls D′ are caused to revolve at a much greater speed than the rolls D, and are provided with pivoted adjustable scrapers H, having thumb-screws I for setting them up against the rolls. The construction of these scrapers is more clearly described in a separate application for Letters Patent, filed of even date herewith, Serial No. 241,270. The rolls D do not require scrapers, as the greater speed of rollers D′, which work against them, keeps them clean.

In consequence of the much greater speed of rolls D′, the material does not fall perpendicularly after passing through each pairs of rolls, but is thrown under the rolls D. The pairs of rolls are therefore placed in a zigzag series, and the subordinate frames G are slid into the side frames, A, from opposite sides alternately. This construction admits of any pair of rolls and their subordinate frames being removed without disturbing the other parts. The whole machine is very compact, and does not require a very high mill-house to be built over it.

K shows gather-boards which prevent any of the material from falling perpendicularly when the machine is being stopped or started.

$P' P^2$ are fast and loose pulleys for the driving-belt, mounted on the end of shaft L, which extends clear across one end of the machine.

L^2 is a toothed wheel secured upon shaft L and gearing into a toothed wheel, L^4, secured upon the shaft L^6, which forms an extension of one of the high-speed rolls D′.

M′ are intergearing toothed wheels secured on the end of the rolls D′ at one side of the machine.

The gearing for driving the slow-speed rolls D consists of the toothed wheel L′, secured on shaft L at the other side of the machine, which gears into the toothed wheel L^3, secured upon shaft L^5, which forms an extension of one of the rolls D.

M are toothed wheels which couple all the rolls D together. The series of toothed wheels M M′ cause each pair of rolls to revolve at the same relative speed.

N is a small pulley secured on the shaft L and connected by the belt N′ with the large pulley N^2, secured upon shaft N^3.

N^4 is a small toothed wheel secured upon shaft N^3, which gears into the large toothed

wheel N^5, secured upon an extension of the roller E. The roller E' has a small toothed wheel, O^3, upon one end of it, which gears into the larger toothed wheel, O^2, upon the end of roller E, so that roller E' is driven the faster. As indicated by the proportion of the various toothed wheels, the rollers E E' are driven much slower than the rolls D D'. The roller E also has the toothed wheel N^6 secured upon its spindle, which gears into the toothed wheel N^7, secured upon shaft O, which drives the conveyer-belt O', and thereby delivers a continuous feed of material to the distributing-rollers E E', as more fully described in a separate application for Letters Patent, filed of even date herewith, Serial No. 241,268. The rollers E E' distribute the material and correct any slight unevenness or irregularity of the feed, which might cause an explosion between the rolls D D' if not checked.

P is the delivery conveyer-belt passing over roller P^5, and more fully described in the last above mentioned separate application.

P^4 is a pulley for driving the belt P, which receives its motion from the shaft L by means of the pulley P^6 and the belt P^3, which passes over the said pulleys P^6 and P^4.

It will be noticed that the feed and delivery are automatic and are driven from the machine itself; also that any pair of rolls can be removed for repairs without taking the whole machine to pieces.

The arrangement of the gearing and driving pulleys is such as to give very great accessibility to all the various parts of the mill, both for repair and adjustment, and to allow free vent to the gases produced when a slight explosion occurs between the rolls, thus reducing the liability to damage of the various parts of the machine when such explosions occur. When a serious explosion occurs between the rolls, which wrecks the upper portion of the mill, the supply of powder is cut off by the conveyer ceasing to receive its motion from the mill.

What I claim is—

1. In a gunpowder-mill, the combination of the side frames provided with deep slots, the subordinate frames removably secured within the said slots, and the adjustable rolls for the powder journaled in the said subordinate frames.

2. In a gunpowder-mill, the combination of the side frames provided with deep slots arranged alternately, with their open ends at opposite sides of the side frames, the subordinate frames removably secured within the said slots, and the adjustable rolls for the powder journaled in the said subordinate frames.

3. In a gunpowder-mill, the combination, with the adjustable roll D, of the hollow roll D', driven at a much greater speed, pipes for circulating water within the hollow roll D', and a scraper for preventing accumulations upon the surface of the said hollow roll.

4. In a gunpowder-mill, the combination of the adjustable rolls D and the hollow rolls D', arranged zigzag in pairs, one above the other, the rolls D' being driven at a much greater speed than the rolls D, gather-boards for guiding the material between each pair of rolls, pipes for circulating water within the hollow rolls, and the scrapers for cleaning the said hollow rolls.

5. In a gunpowder-mill, the combination of the side frames, the rolls moving with unequal speed and journaled in the frames in pairs, one above the other, toothed gearing connecting each similar roll so that each pair is driven at the same relative speed, and a pair of distributing-rollers journaled above the top pair of rolls, also driven with unequal speed, but at a much less velocity than the said rolls, whereby the feed of material to the said rolls is rendered perfectly uniform.

6. In a gunpowder-mill, the combination of the side frames, the rolls moving with unequal speed and journaled in the side frames in pairs, one above the other, the toothed gear-wheels M and M' on opposite sides of the machine connecting each similar roll, so that each pair is driven at the same relative speed, the toothed wheels L^2 and L^4 for operating the wheels M', the toothed wheels L' and L^3 for operating the wheels M, and a driving-shaft passing across the machine journaled in the side frames, and having said wheels L' and L^2 and driving-belt pulleys secured upon it.

7. A gunpowder-mill comprising a series of revoluble rolls arranged in pairs, one above the other, and driven at unequal speed, a pair of slow-moving distributing-rollers journaled above the top pair of rolls, a roller for the feed-conveyer belt journaled above the distributing-rollers, a roller for the delivery conveyer-belt journaled below the lowest pair of rolls, a shaft provided with driving-pulleys and extending across the machine, and intermediate gearing connecting all the rolls and rollers with the said driving-shaft, the whole supported by side frames and mounted upon a common base-plate, substantially as set forth.

8. In a gunpowder-mill, the combination of the side frames, A, provided with deep slots arranged alternately with their open ends at opposite sides of the side frames, the slotted subordinate frames G, provided with flanges, the bolts R, passing through said flanges and securing the subordinate frames in position in the deep slots of frames A, the rolls D and D', arranged zigzag in pairs, one pair above the other, and carried by the subordinate frames G, the separate sliding journal-blocks for the rolls D, and the adjusting-screws F for regulating the position of said rolls D, substantially as set forth.

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

PAUL A. OLIVER.

Witnesses:
CHAS. P. HUNT,
GEO. GUNTZ.