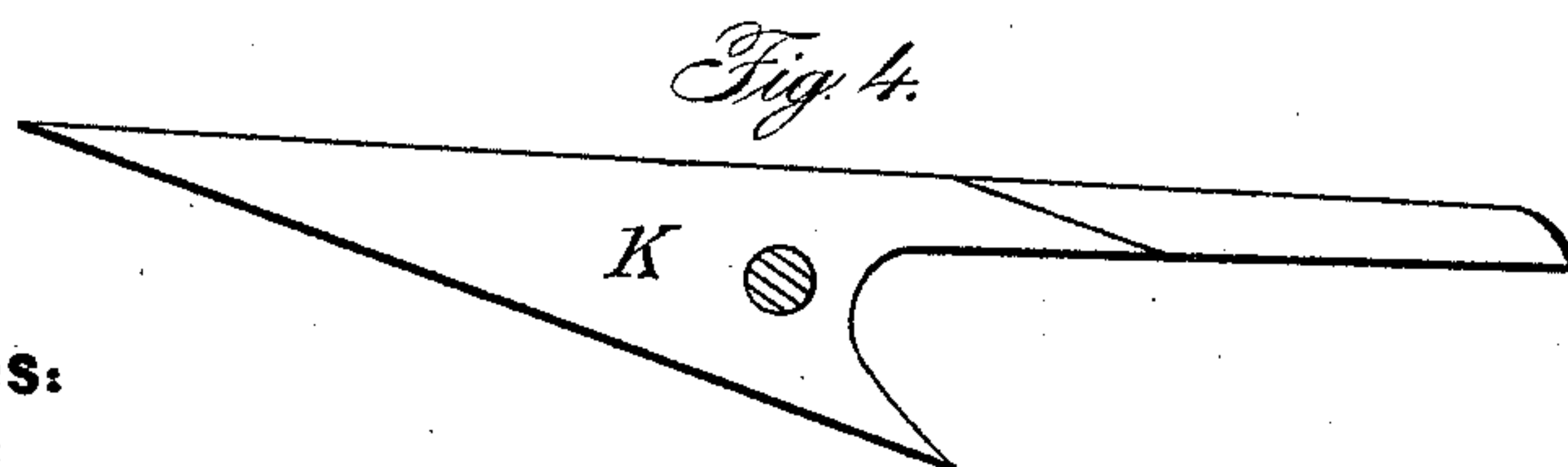
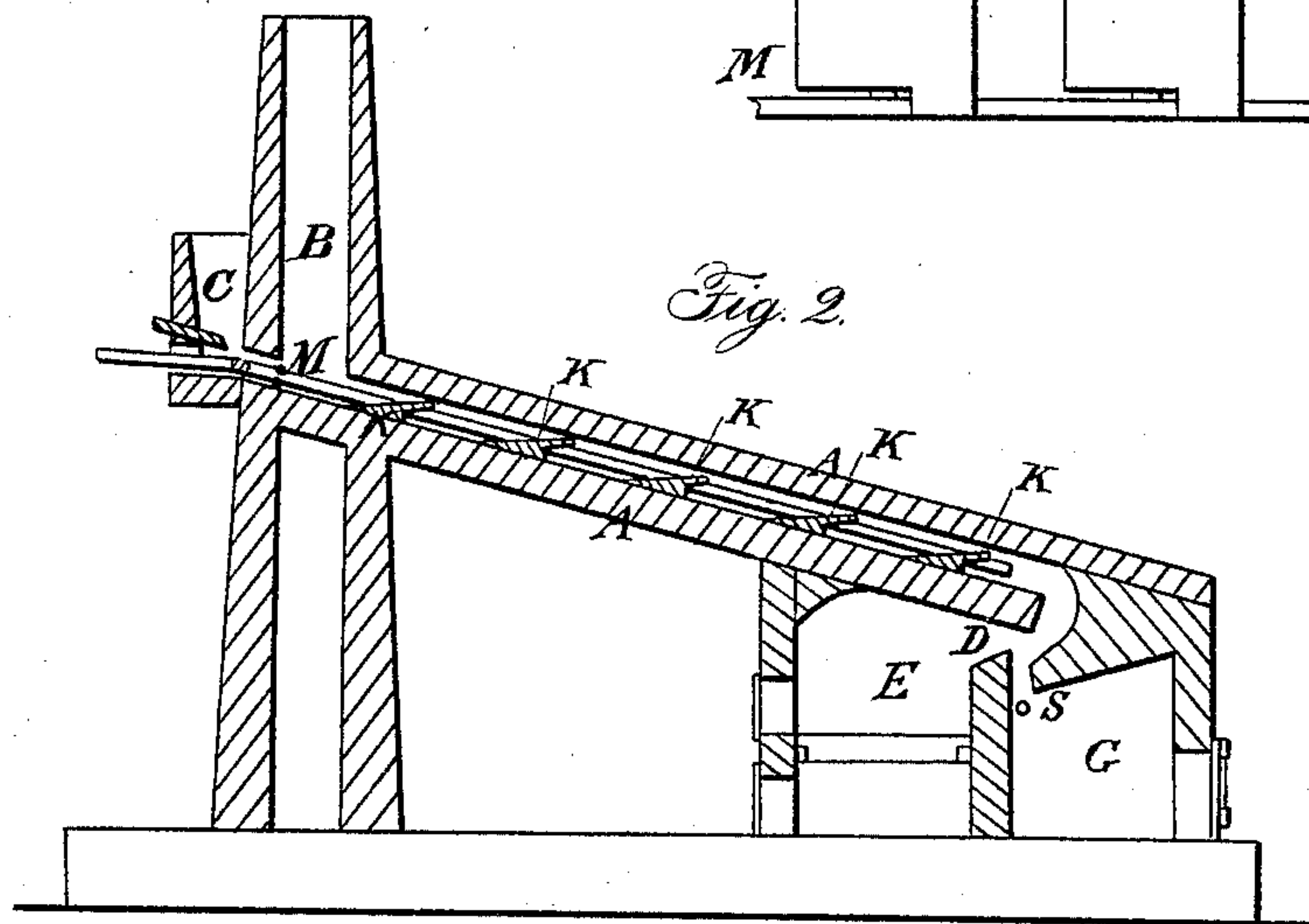
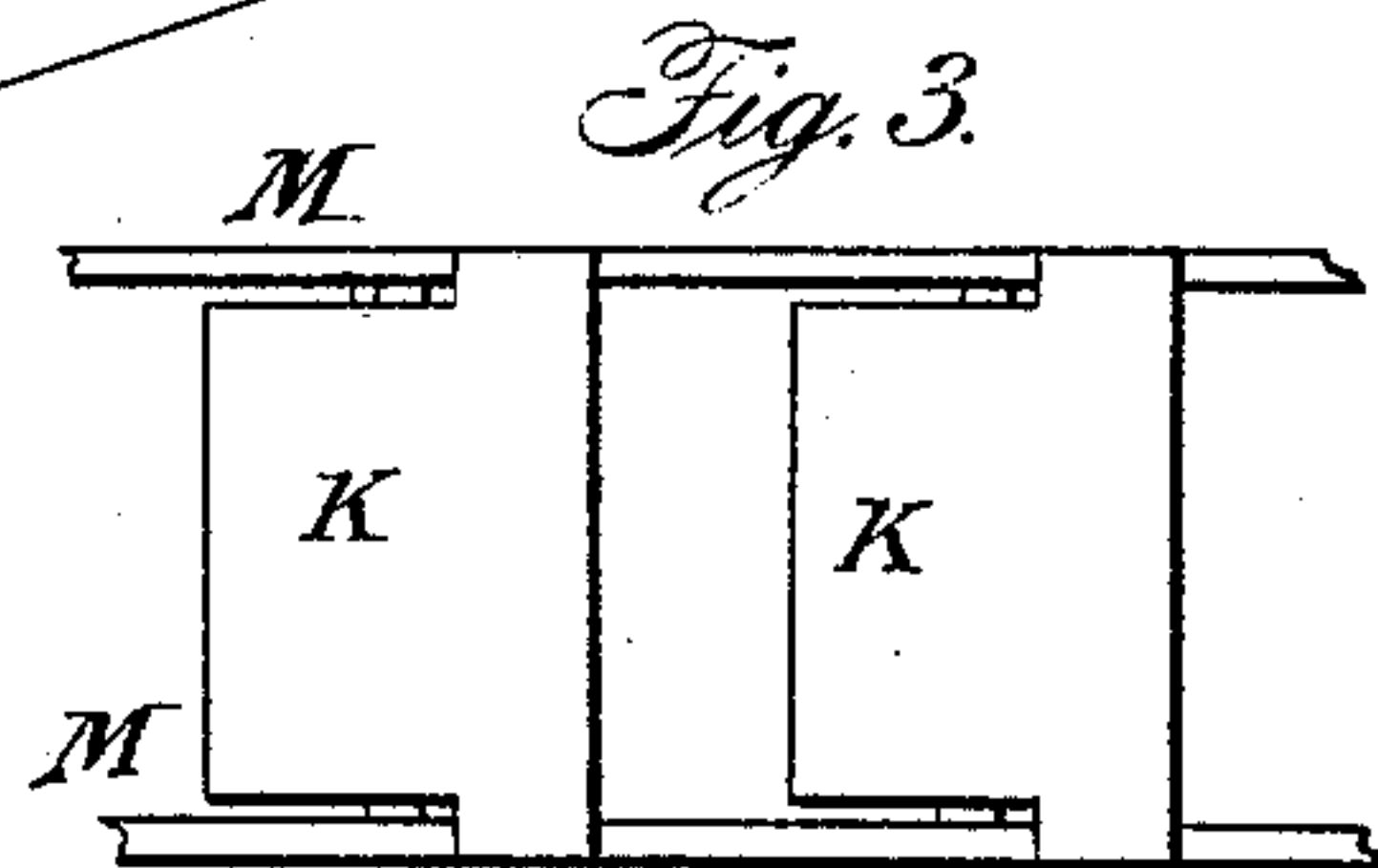
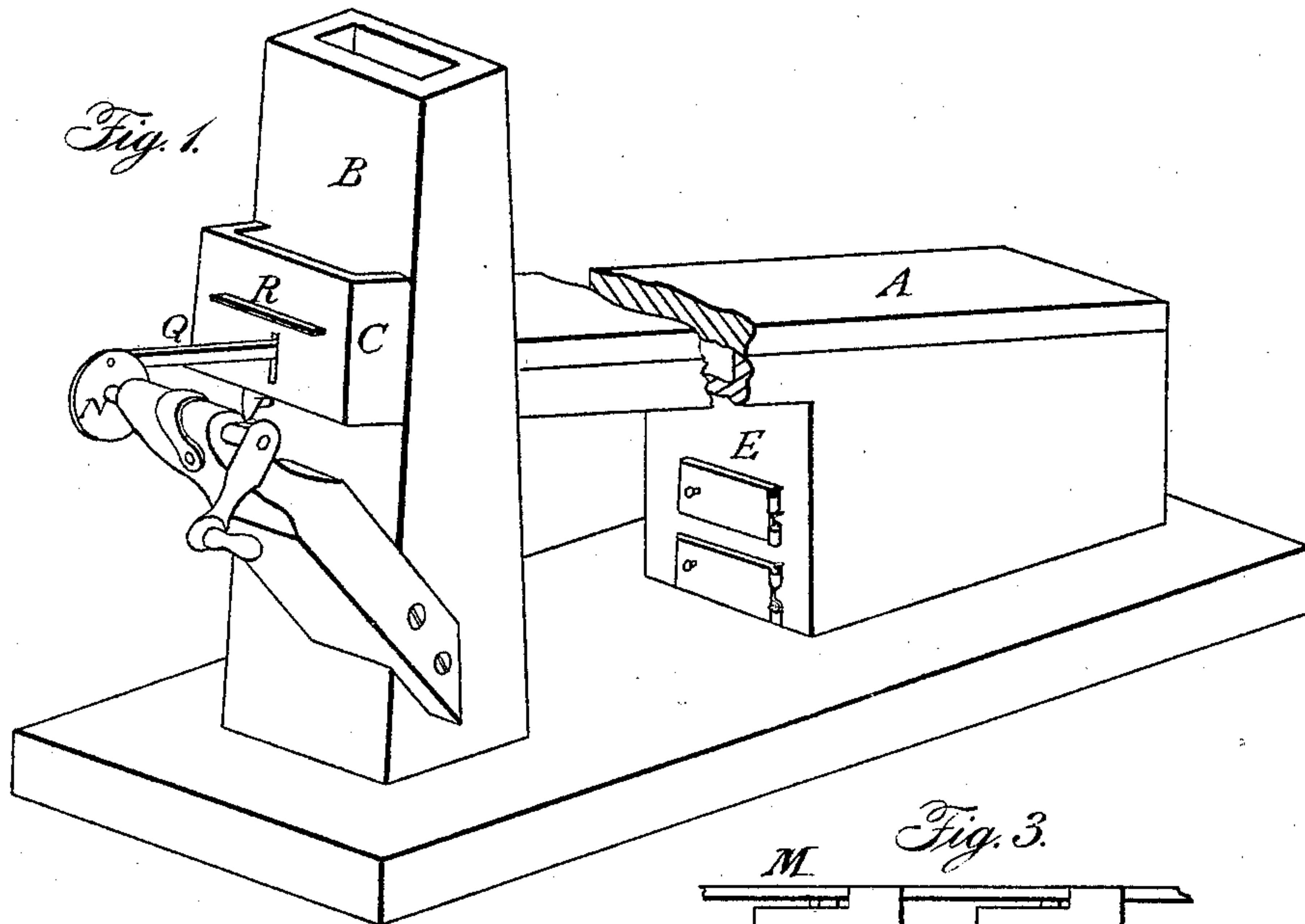


CROSBY & HELM.

Roasting Ores.

No. 57,293.

Patented Aug. 21, 1866.



Witnesses:

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# UNITED STATES PATENT OFFICE.

FRANCIS W. CROSBY AND WOODHULL HELM, OF NEW YORK, N. Y.

## IMPROVED APPARATUS FOR DESULPHURIZING ORES.

Specification forming part of Letters Patent No. 57,293, dated August 21, 1866.

*To all whom it may concern:*

Be it known that we, F. W. CROSBY and WOODHULL HELM, of the city, county, and State of New York, have invented a new and Improved Apparatus for the Desulphurization of Pulverized Ores, and for other purposes; and we do hereby declare the following to be a full, clear, and exact description of our invention, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a perspective view of our improved apparatus; Fig. 2, a longitudinal section thereof; Fig. 3, a detached plan view of two of the conveying tables or shelves; and Fig. 4, an enlarged side view of one of said tables detached.

Similar letters indicate like parts in each of the drawings.

The nature of our invention consists in the combination of a series of sliding tables or shelves driven by suitable machinery with an inclined plane, forming the bottom of a flue, through which the desulphurizing-gases are made to flow in a strong current to convey the pulverized ore at any desired speed in a succession of falls or cascades in a direction opposed to the current of gases active thereon; also, in the combination of the mouth of the eduction-flue of the furnace, from which the desulphurizing-gases issue, with the lower extremity of the inclined flue in such a manner as that the pulverized ore shall fall in a thin sheet or stream directly over the mouth of the eduction-flue, insuring thereby final direct contact of the inflamed gases with each particle of the ore.

Our apparatus consists mainly of a long shallow flue, A, built of brick, tile, or other suitable material, and having an inclination of about ten degrees, more or less. The proportions of this flue may be about that of three feet in width and six in depth; and it may be built upon the slope of a hill or embankment, or supported upon arches, trestle-work, or other suitable support. The length will vary with the class of ores to be treated—say from twenty to fifty feet. Its upper end opens into a suitable upright stack or chimney, B, of such a height as will insure a strong draft through the flue A, and in the rear of the opening into this chimney is placed a hopper or receiver, C, into which the pulverized ores to be treated are fed.

The inclined flue A is made to terminate immediately over the mouth or opening of the flue D, supplying the active gases generated in the furnace or fire-chamber E of the apparatus, and the end of the upper plate or top of the inclined flue A is so curved downward and inwardly in front of said flue, as illustrated in Fig. 2, as to partially inclose also the mouth of the eduction-flue D of the fire-chamber and conduct the ore falling from the inclined flue A over the same into a suitable receiving-chamber, G, constructed immediately beneath it.

A steam-pipe, S, pierced with small apertures, so as to allow the steam to escape therefrom in fine jets, is placed immediately below the eduction-flue from the furnace, so as that the desulphurized ores may be exposed to the action of a current of steam at this point.

For greater compactness and convenience we construct the fire-chamber E of the apparatus under the inclined flue A, in the rear of the lower extremity thereof. This fire-chamber E is so arranged and constructed as to best obtain a decomposition of steam in contact with incandescent fuel therein, and the products of the combustion of the fuel and of the decomposition of the steam are conducted to the inclined flue, as already described.

Within the inclined flue A we place a series of conveying tables or shelves, K K K, so formed, as seen in Figs. 2 and 4, (or otherwise supported upon the inclined plane of the flue,) as that when arranged in the flue their upper surfaces shall be horizontal, or, at least, but slightly inclined. These conveying shelves or tables are left free to slide along the flue, but are connected together at suitable distances by means of side rods, M M, Fig. 3, extending the entire length of the flue, and to which each table is pivoted, as seen Fig. 3. These rods M M are united by a cross bar or head at their upper end, and are made to slide back and forth slowly, and with a short movement in the flue, by means of the eccentric-connection of a link, Q, with a disk, N, upon a revolving shaft, P, outside of the apparatus, in the rear of the chimney.

The hopper is provided with a suitable check-gate, R, Fig. 2, to regulate the admission of the ore into the operating-flue A.

The operation of the apparatus is very simple. The shaft P, being put into motion by any suitable power, imparts a short sliding



back-and-forth movement to the tables K K of the flue A, so that the finely-pulverized ores fed into the upper end of said flue through the hopper C will be slowly conveyed forward and made to fall from shelf to shelf, from said upper and cooler end to the lower and hotter part of the inclined flue A until they reach its extremity and drop into the receiving-chamber G of the apparatus through the flame and gases issuing from the furnace and the jets of steam escaping from the pipe S.

The gases from the furnace, with the steam from pipe S, Fig. 2, pass upward from the lower end of the inclined flue A through the same in a direction opposed to that of the current of the ore, whose particles, as they fall successively from shelf to shelf, are thus thoroughly exposed to the purifying, desulphurizing, and oxidizing power of said gases.

We contemplate the employment of this apparatus, not only in the desulphurization of ores, as described, but also in drying grain; &c., under the influence of a current of heated air.

Having thus fully described our improved

apparatus, what we claim therein as new, and desire to secure by Letters Patent, is—

1. The combination of a series of sliding tables or shelves, with the interior of an inclined hot-air or gas-conducting flue, substantially in the manner and for the purpose herein set forth.

2. In our improved apparatus, so combining the lower extremity of its inclined flue with the eduction-flue of the furnace as that the ore or other material falling from the inclined plane shall drop in a thin sheet over the mouth of the said eduction-aperture, substantially in the manner and for the purpose herein set forth.

F. W. CROSBY.

WOODHULL HELM.

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