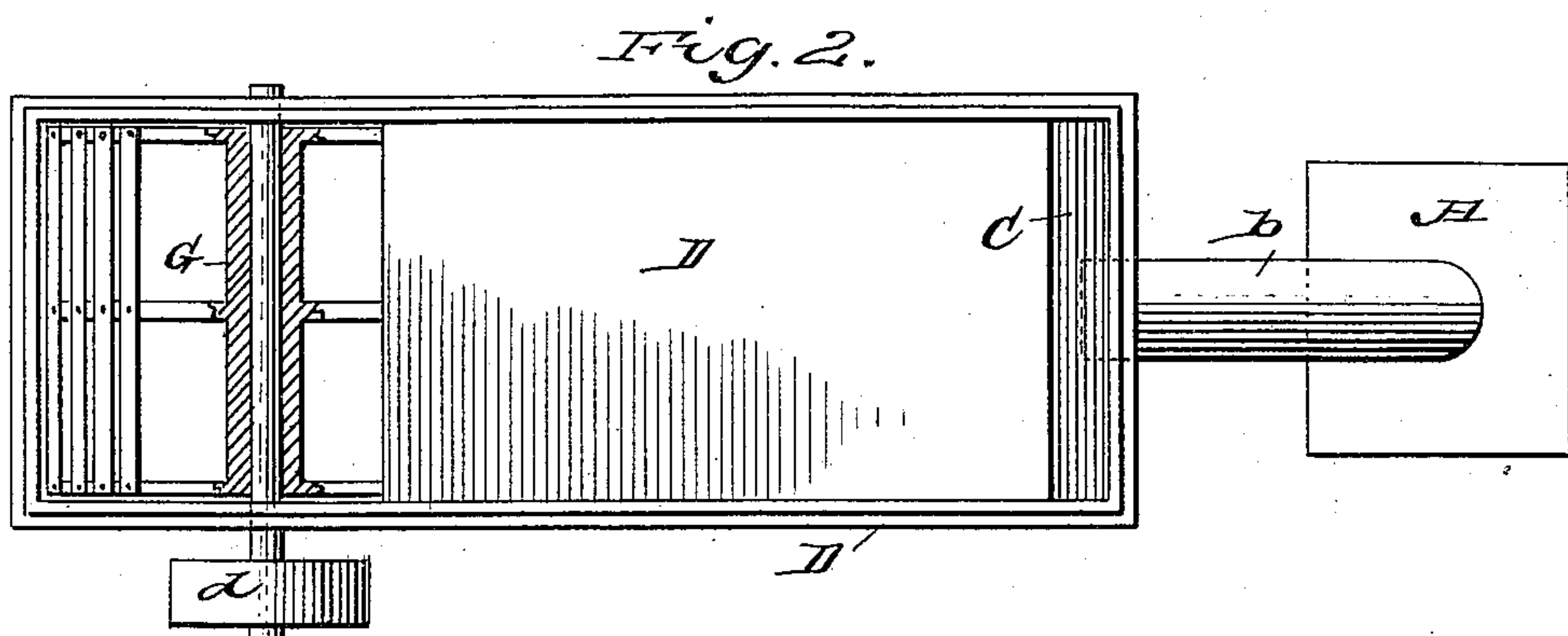
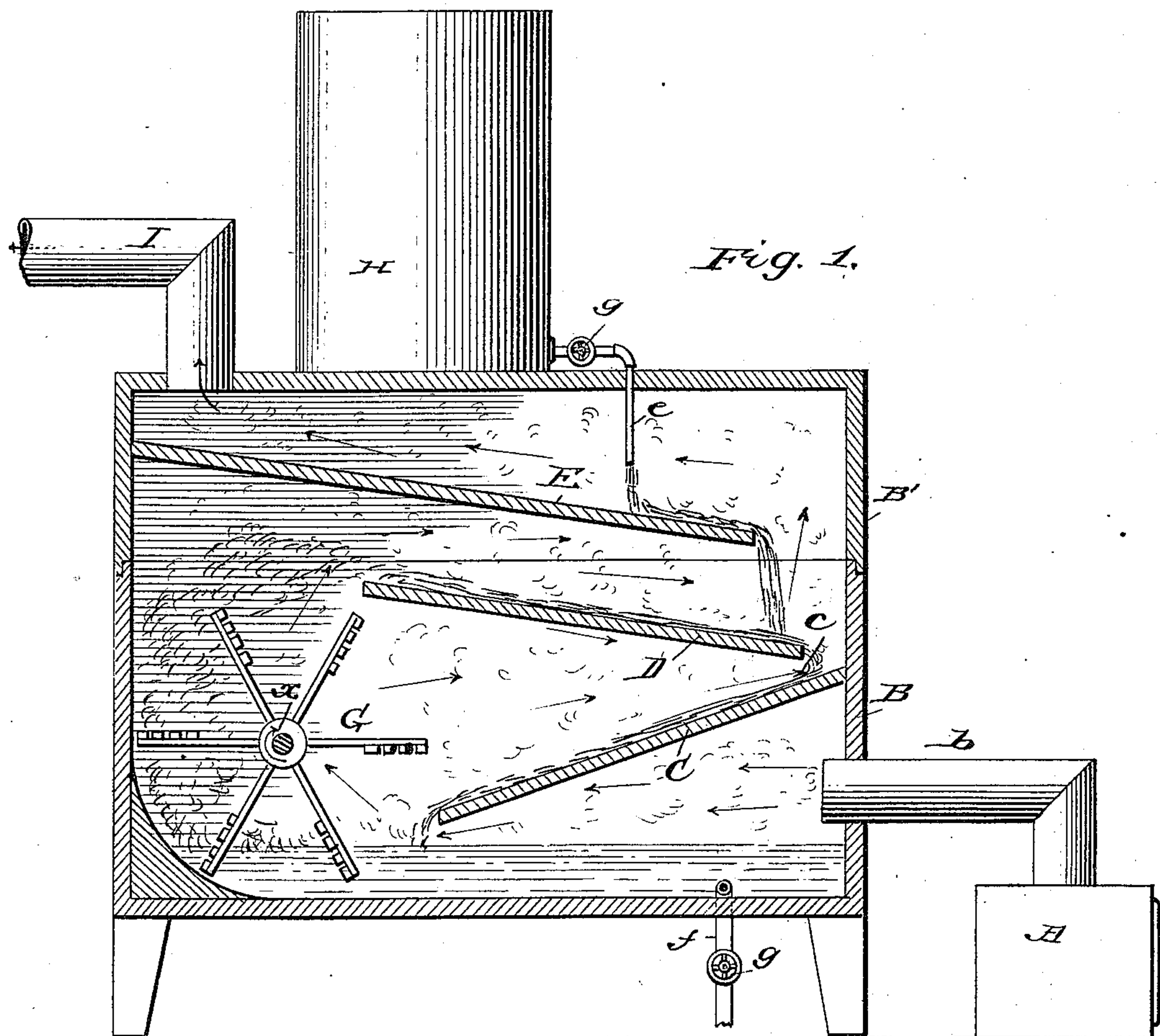


(No Model.)

M. A. PIEDRA.  
APPARATUS FOR WASHING GASES.

No. 419,350.

Patented Jan. 14, 1890.



WITNESSES:

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MANUEL A. PIEDRA, OF SCHRIEVER, LOUISIANA.

## APPARATUS FOR WASHING GASES.

SPECIFICATION forming part of Letters Patent No. 419,350, dated January 14, 1890.

Application filed April 1, 1889. Serial No. 305,526. (No model.)

*To all whom it may concern:*

Be it known that I, MANUEL A. PIEDRA, of Schriever, in the parish of Terre Bonne and State of Louisiana, have invented a new and  
5 useful Improvement in Machines for Washing Sulphur-Fumes, of which the following is a full, clear, and exact description.

This invention relates to apparatus for washing the sulphur-fumes used on sugar-  
10 plantations for bleaching the cane-juice previous to its conversion into sugar. Ordinarily these fumes are passed to the cane-juice in an unwashed or partially-washed state and also very hot, which converts a portion of  
15 the juice into sulphuric acid, thereby inverting the sugar and producing corresponding loss.

The object of my invention is not only to obviate this, to a large extent at least, by  
20 thoroughly washing the fumes and conveying them pure and cold to the cane-juice in the ordinary or any suitable sulphur-machine, but to insure a more perfect regulation of the fumes and prevent their escape into the  
25 sugar-house, which produces suffocation to the workman and has other bad effects; also, to secure various other advantages, as hereinafter named, and to produce better sugar and secure a high grade of molasses.

30 My invention consists in a machine of novel construction for the purpose specified, the same including special combination of parts, substantially as hereinafter described, and pointed out in the claims.

35 Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in both the figures.

40 Figure 1 represents a mainly sectional elevation of a machine or apparatus embodying my invention and as connected with an ordinary sulphur-burning furnace or oven. Fig. 2 is a plan view of the lower main or body  
45 portion of the same, with a fan-wheel used therein in partial section.

50 A indicates the usual oven in which the roll-sulphur is burned. From this furnace or oven the sulphur-fumes are conducted by a pipe *b* into the one end of the lower or main body portion B of a close case B B'. This case or chamber—that is, its lower and upper portions B B'—is fitted with boards C D E,

extending across the case from side to side, but stopping short of the opposite ends of the case, toward which they incline, as shown. 55 Thus the lower board C abuts against the end of the case, in which the fumes are introduced above the pipe *b*, and, extending a portion of the distance of the length of the case, inclines downwardly toward the opposite end of the 60 case, leaving a clear space beneath it and past its lower end. The next inclined board D above inclines in a reverse direction and joins neither end of the case, but at its lower end leaves an opening *c* between it and the 65 board C and front end of the case, while the remaining board E, above the board D, inclines in a like direction to the latter from the back end of the case to nearly over the lower end of the board D. The inclined boards 70 establish a free backward and forward circulation for the sulphur-fumes and for currents of cooling-water, as hereinafter described.

In the lower portion of the case, at or near its back end and in rear of the boards C D, 75 is a fan-wheel G, which may be fitted with any desired number of arms and vanes, and is made to rapidly rotate, as indicated by the letter *x* in Fig. 1. This wheel may be driven by a pulley *d* on its shaft from a pulley on 80 the usual sulphur-machine or otherwise.

H is a tank of cold water upon top of the case B B', and from which water is passed by a pipe *e* to the lower end portion of the inclined board E, and from thence on to the 85 lower end part of the board D, and from the latter down the lower board C to the bottom of the case, which is fitted with a discharge-pipe *f*. These inlet and outlet pipes *e f* for the water are both fitted with regulating 90 cocks or valves *g* to proportion the supply of cold water in the case and make it constant in quantity and uniform in its height within the lower portion of the case below the board C, and so that it will not back down the pipe 95 *b* of the sulphur-burning oven to extinguish the fire. A glass gage on the outside of the case may be applied to determine this.

I is a pipe for conducting the washed and cooled sulphur-fumes to the ordinary sul- 100 phur-machine for incorporation with the cane sugar-juice.

The course of the fumes through the apparatus is indicated by the several arrows



other than the one marked  $\alpha$ , said fumes passing under, over, and between the inclined boards C D E, and having a perfect circulation through the case subject to the cooling  
 5 action of the water from the tank H, the fan-wheel G cutting and churning both the water and the fumes to effect a perfect exposure of the latter to the water. In this way or by these means the sulphur-fumes coming from  
 10 the oven are thoroughly washed and cooled and introduced pure and cold to the cane-juice in the sulphur-machine. The circulation of the cold water is assured and perfectly regulated, removing the tendency in  
 15 the fumes to form sulphuric acid.

By conveying cold fumes to the sulphur-machine for incorporation with the cane-juice not only is the sugar protected from being destroyed, but also the pipe which conducts  
 20 the fumes from the washing-machine to the cane-juice, and that otherwise is apt to be burned and require frequent renewal. The fumes being kept wholly under cover, there will be no objectionable escape of them into  
 25 the sugar-house. Furthermore, a constant and uniform draft will be kept up from the sulphur furnace or oven, and by using an artificial draft for the fumes the sugar-maker is better enabled to regulate the quantity of  
 30 sulphur burned. Finally, by means of this improved apparatus as fine sugar can be made with common kettles as with the usual improved steam-trains, inversion of the sugar by the action of the sulphur is largely avoided;  
 35 and a high grade of molasses and superior quality of sugar produced.

An important feature of this improvement is that in the old process or with the apparatus heretofore in use, where the fumes are  
 40 only partly washed, the regular sulphur-machine fan draws small particles or globules of sulphur, which remain in the sugar and show their presence in the scum which arises to the top of the liquid in which the sugar is  
 45 dissolved or in the deposit. By my improved washing apparatus said particles have no chance of passing on to the juice, but are caught by the water and held to be turned off in the waste. This has been demonstrated  
 50 by actual test between sugar made by the old apparatus and by my improved one.

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

1. In apparatus for washing and cooling 55 sulphur-fumes in the manufacture of sugar, the combination, with a close case adapted to connect below with a sulphur-burning oven or furnace and above with a duct for conveying the fumes to the juice to be treated, of a 60 series of boards or partitions adapted to circulate the fumes and cold water through the case, an artificial-draft device within the case adapted to draw the fumes from the furnace and to cut and churn the water and fumes 65 within the case, and means for regulating the supply of washing and cooling water to and from the case, substantially as specified.

2. In apparatus for washing and cooling 70 sulphur-fumes, the combination, with a close case having a suitable inlet and outlet for said fumes, of inclined boards or partitions within the case adapted to circulate the fumes and an incoming current of water in reverse directions through the case, and a fan-wheel within the case adapted to act both as 75 a draft device for the fumes and as a stirrer of the fumes and water, essentially as described.

3. The combination of the water-inlet pipe 80  $e$  and water-outlet pipe  $f$ , each provided with a regulating-valve  $g$ , the close case B B', having a suitable fume-inlet and fume-outlet, and the fan-wheel G, arranged for operation in relation with each other essentially as 85 shown and described.

4. In apparatus for washing and cooling sulphur-fumes in the manufacture of sugar, the combination of the sulphur-burning oven or furnace A, having an outlet-pipe  $b$ , the 90 close case B B', the inclined boards C D E within the case, the fan-wheel G, the tank H, the water-inlet pipe  $e$  and water-outlet pipe  $f$ , with their regulating-valves  $g$ , and the outlet-pipe I for the washed and cooled fumes, 95 substantially as specified.

MANUEL A. PIEDRA.

Witnesses:

J. INFANTE, Jr.,  
 PAUL E. THÉARD.