(No Model.) 2 Sheets—Sheet 1.

C. J. HEXAMER.

MECHANISM FOR EXTINGUISHING FIRES IN MALT AND GRAIN MILLS.

No. 347,797. Patented Aug. 24, 1886.

Fig. 1.

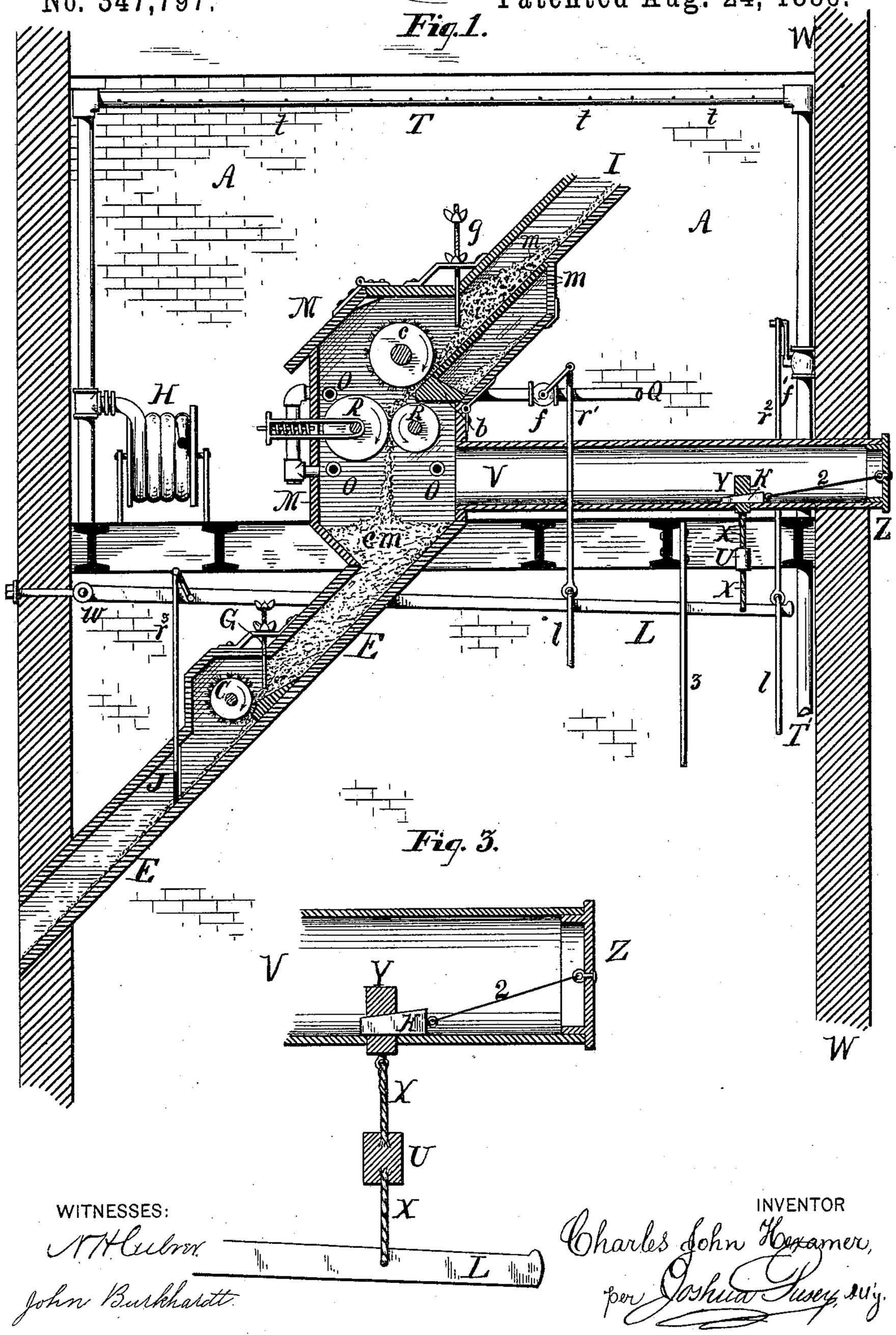

Fig. 3.

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(No Model.) 2 Sheets—Sheet 2.

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MECHANISM FOR EXTINGUISHING FIRES IN MALT AND GRAIN MILLS.

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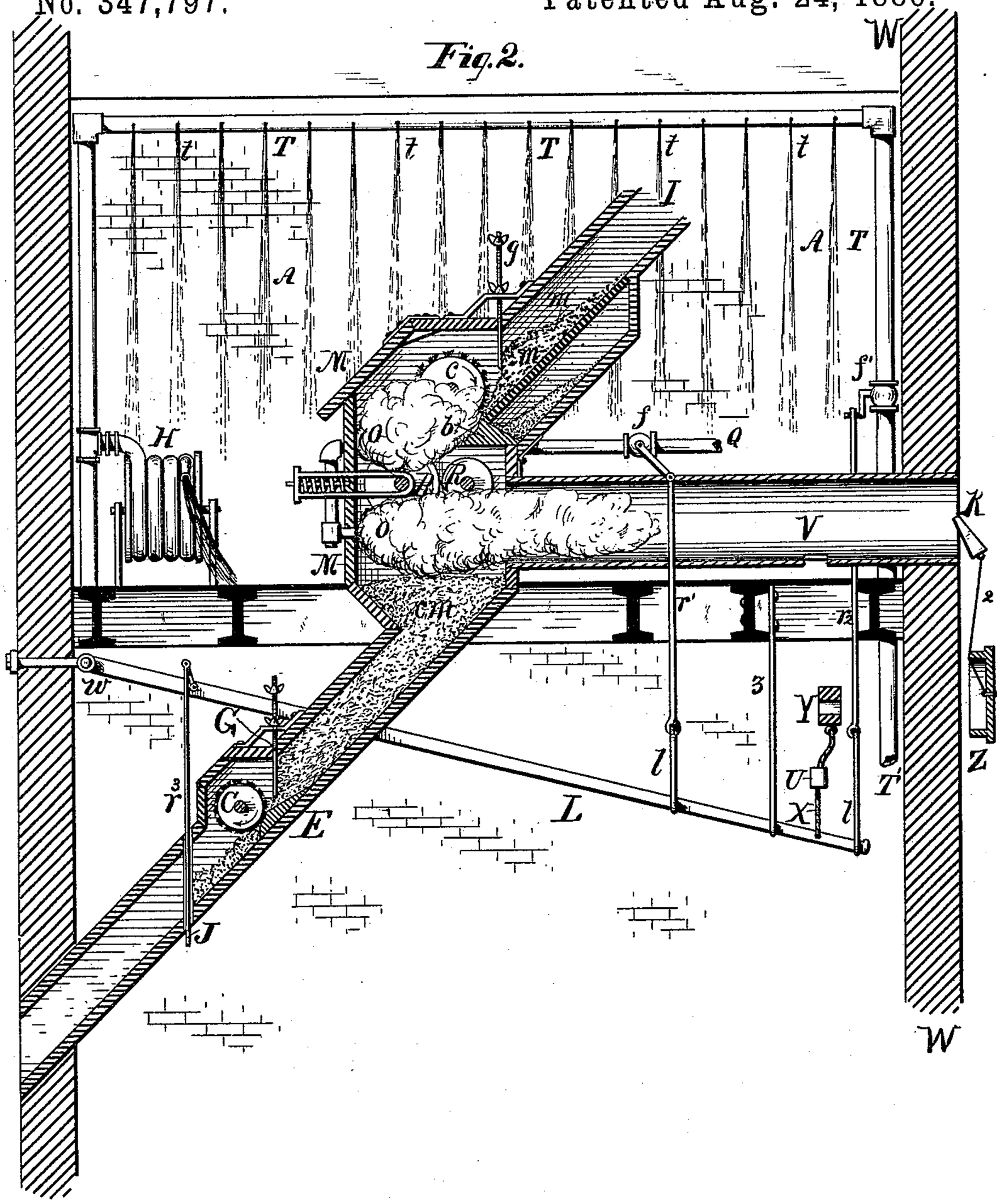
Fig. 2.



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MECHANISM FOR EXTINGUISHING FIRES IN MALT AND GRAIN MILLS.

SPECIFICATION forming part of Letters Patent No. 347,797, dated August 24, 1886.

Application filed August 24, 1883. Serial No. 104,622. (No model.)

To all whom it may concern:

Be it known that I, CHARLES JOHN HEXAMER, a citizen of the United States, residing at the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Mechanisms for Extinguishing Fires in Malt and Grain Mills, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

Figure 1 is a transverse vertical section of a malt or grain crushing or grinding mill provided with my improvements. Fig. 2 is a similar sectional view thereof, showing the positions of the several par s upon the occurrence of a dust-explosion within the mill-box. Fig. 3 is a detail, enlarged, of parts of the vent-pipe and drop-lever and devices for supporting the latter.

These improvements are designed to extinguish at their incipience fires resulting from explosions of the impalpable malt or grain dust occasioned by the ignition of such dust from sparks thrown off by the mill-rolls striking some hard substance—such as a piece of iron—in the process of grinding or crushing the malt or grain. It is well known that such explosive fires have frequently been of a very serious character, because, more especially, of their extending from the mill-box to the elevator-boots, by which they ascend to the upper stories, and thus spread throughout the entire building.

The object of my present invention is to prevent such catastrophes, which I do by the following means:

Referring to the accompanying drawings, A is the mill-room; M, the mill-box situated therein; R R, the grain-crushing rolls; I, the influx-pipe by which the grain or malt *m* is conducted to fall between rolls R R, and E the efflux-pipe inclined and leading to the elevator boot. (Not shown.)

The dimensions of the stream of malt allowed to flow onto the crushing-rolls is regulated by means of a vertically-adjustable gate, *g*, in the inlet-pipe. The malt which has escaped beneath this gate descends between a feed-roller, *c*, and a correspondingly curved-face block, *b*, whereby it is spread out, and thence falls between rolls R R, as seen in Fig. 1.

The foregoing, together with some other details relating to the construction of the mill-box that I have not deemed it necessary to describe, are well known and not my invention.

The crushed malt or grain passes onto the elevator-boot by way of the pipe E freely—that is, in mills of the usual construction. I, however, interpose and maintain a barrier in this pipe, composed of a body of the crushed malt *c m*, by means of a device which I term a "discharger," and which is located at a suitable point in said pipe. This discharger consists, in the present instance, of an adjustable gate, G, and a rotating roller, C, with a curved-face block, which devices operate to discharge the crushed malt just as the above-described feeder in the influx-pipe operates to feed the grain to the rolls R R. The discharger and the feeder are, however, relatively adjusted so that a plenum of the crushed grain will always be maintained in the efflux-pipe above the discharger and in the hopper-shaped bottom of the mill-box, as seen in the drawings, Figs. 1 and 2, so that the results of an explosion and fire within the mill-box are prevented from extending by way of pipe E to the elevator-boot.

The construction and operation of the foregoing-described devices are fully explained and shown in an application for Letters Patent entitled "Improvements in the Construction of Malt and Grain Mills," filed by me February 27, 1883, (Serial No. 86,498,) for which Letters Patent No. 292,488 were granted me January 29, 1884. As also described in said patent, an additional barrier is caused to be interposed between the mill-box and the elevator-boot in case of explosion or fire by means of a gate, J, across the efflux-pipe E, which gate is connected with a drop-lever, L, by a rod, r^3, as hereinafter referred to.

V is an ample vent-pipe, forming a communication between the interior of the mill-box and the open air outside the wall W of the building.

In order to smother the fire confined within the mill-box immediately upon the occurrence of an explosion therein, I provide steam-jet pipes O, opening into box M, and connecting with a steam-supply pipe, Q, from the boiler. To a conveniently-placed stop-cock, *f*, in the latter pipe I connect a rod, r', which is also connected with a long lever, L, pivoted at *w*,

as above mentioned, and is sustained in or near a horizontal position at or near its free end, as hereinafter to be described, so that while the latter is supported, as in Fig. 1, the cock *f* is turned so as to shut off the steam; but when the said support is taken away the lever L, falling, forces the rod *r'* down with it, opens the cock, and the steam thereupon rushes through the ports O, fills the mill-box, and extinguishes the fire.

The free end of lever L is held up in the following manner: A rod or rope, X, which is fastened to the lever, has a slotted block, Y, at the other extremity, which block extends up through a slot in the under side of the vent-pipe V, which it will be remembered extends from within the mill-box. This block and, by sequence, the lever L are up held by means of a wedge or key, K, passed through a slot in the former, and bearing upon the bottom of the vent-pipe on either side of the slot therein, as clearly shown in Figs. 1 and 3. I prefer to make this key of oiled wood or other material that will not be apt to rust or stick, but which can always be relied upon for the purpose in view. It is connected by means of a rod or cord, 2, with a cap, Z, which covers the outer extremity of the vent-pipe. Now, should an explosion occur within the mill-box, this cap will be blown off, and thereby causing the withdrawal of the key K from the block Y, the lever L drops by its own gravity, (or it may be suitably weighted,) and the immediate result is, that the rod *r'*, which, as stated, connects the steam-cock with the lever, opens the former, and the steam rushes into and fills up the mill box, as seen in Fig. 2. In lieu of steam, some other fluid extinguisher might be applied in the same manner—carbonic acid, for example.

In case the fire should extend outside the mill-box, I cause the flooding of the mill-room with water, in order to extinguish the fire, by providing a suitable arrangement of pipes or conduits, T, with orifices *t* therein, also, if desired, a hose, H, and connect the cock *f'* of a water-supply pipe, T', by means of a rod, r^2, with the actuating-lever L, so that when the latter is caused to drop the cock will be opened, and the water thereby be allowed to escape through the orifices *t*, and also through the nozzle of the hose, whereby a stream of water may be directed to any particular point or points. Instead of connecting rods *r'* and r^2 rigidly to the actuating-lever, I prefer to add to said rods, respectively, a link, *l*, through which lever L passes, thus insuring the turning of the cocks by the force acquired by the momentum of the lever. A catch or loop, 3, through which the lever also passes, serves to check its fall when its work is accomplished, and prevents it from breaking or unduly straining the cocks and connections.

In order to make sure the drop of the actuating-lever in case the cap Z should chance not to be blown off, or the supporting-key not be drawn out, and the flames should extend outside the mill-box, I make the connection X, which holds up the lever, of cotton, hemp, or other readily-inflammable material, which, taking fire, soon severs, and thereby allows the lever to fall; and, further, in order "to render assurance doubly sure," in case the flames shall not reach or quickly operate as expected, I make the rope (or rod) X, instead of integral, in sections, and connect these, as seen in Fig. 3, with a coupling, U, composed of some fusible alloy which melts at a comparatively low degree of heat—say about 150°—and which, becoming melted from the heat from the fire, breaks the connection between the rope-sections and permits the lever L to fall. Suitable alloys for this purpose are well known, and I need not therefore mention any formulæ therefor. The fall of the lever, to which gate J is connected by rod r^3, causes the gate to close the passage-way of the efflux-pipe E.

Thus it would seem that in a grain or malt mill provided with the hereinbefore-described improvements or devices a fire occurring within the mill-box or extending to the mill-room will be effectually prevented from extending to and up the elevator-boot.

The results following an explosion of the dust within the mill-box are shown by Fig. 2 of the drawings. The cap Z has been blown off by the force of the explosion, the steam is rushing into the mill-box, the water through the orifices *t* and out of the hose-nozzle, and the gate J has fallen across and stopped up the efflux-pipe.

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

1. A fire-extinguisher consisting of the combination of a mill-box having steam-pipes leading therein, a steam-supply pipe connecting with said steam-pipes and provided with a stop-cock, a gravity-lever provided with a rod attached to the said stop-cock, a vent-pipe communicating with the mill-box, and the means herein shown for retaining the lever in a normal position until released by the force of a dust-explosion, substantially as described, and for the purposes set forth.

2. A fire-extinguisher consisting of the combination of a mill-box having steam-pipes leading therein, a steam-supply pipe connecting with said steam-pipes and provided with a stop-cock, a gravity-lever provided with a rod attached to the said stop-cock, a vent-pipe communicating with the mill-box, the outer end of said vent-pipe being provided with a removable cap, and the separable means herein shown for connecting and retaining said cap and the loose end of the lever in their normal position until the vent-cap is blown out, substantially as described, and for the purposes set forth.

3. A fire-extinguisher consisting of the combination of a hopper-shaped mill-box having steam-pipes entering therein, a steam-supply pipe connecting with said steam-pipes and

provided with a stop-cock, a gravity-lever provided with a rod attached to the said stop-cock, a vent-pipe communicating with the mill-box and the means herein shown for retaining the lever in a normal position until released by the force of a dust-explosion, substantially as described, and for the purposes set forth.

4. A fire-extinguisher consisting of the combination of a mill-box having steam-pipes leading therein, a steam-supply pipe connecting with said steam-pipes and provided with a stop-cock, a gravity-lever provided with a rod attached to the said stop cock, a vent-pipe communicating with the mill-box, and the means herein shown for retaining the lever in a normal position until released by the force of a dust-explosion, said rod being provided with a link to retain the lever when dropped, substantially as described, and for the purposes set forth.

5. The combination of a mill-box, the efflux-pipe E, gate J, gravity-lever L, rod r^2, the vent-pipe V, provided with a removable cap, and the separable means, as shown, for connecting said cap and lever and retaining the lever in a normal position, whereby the lever is dropped by removing the cap and the efflux-pipe closed by the gate, substantially as described, and for the purposes set forth.

6. The means for extinguishing fires in malt or grain mills, consisting of the combination, with the mill-room, of a mill-box, a steam-supply pipe leading into the mill-box, a stop-cock in said pipe, a water-supply pipe, with openings into the mill-room, a stop-cock in said water-pipe, a drop-lever connected with stop-cocks in said steam and water pipes, respectively, and means for supporting said lever, substantially as described, and devices, substantially as described, for causing the same to fall from the effects of a dust-explosion within the mill-box, whereby the steam and water cocks are simultaneously turned on, substantially as and for the purposes set forth.

7. The combination of the mill-room, the mill-box, a steam-supply pipe leading into the mill-box, a stop-cock in said pipe, a water-supply pipe with openings into the mill-room, a stop-cock on said water-pipe, a drop-lever connected with stop-cocks in said steam and water pipes, respectively, and means for supporting said lever, substantially as described, and devices for causing the same to fall from the effects of fire extending outside of the mill-box, whereby the steam and water cocks are simultaneously opened, substantially as and for the purposes set forth.

8. The combination, with the mill-box, of the vent-pipe V, lever L, supporting-rod X, slotted block Y, key K, cap Z, and rod 2, connecting said cap and key, the steam-supply pipe Q, provided with a stop-cock, *f*, rod r', connecting said lever with the said cock *f* of the steam-supply pipe Q, all constructed and operating substantially as and for the purpose set forth.

9. The combination, with the mill-box, of the vent-pipe V, cap Z, block Y, key K, rod 2, pivoted lever L, connection X, rod r^2, and the water-supply pipe T′, provided with cock *f*′, all constructed and operating substantially as described.

In testimony whereof I have hereunto affixed my signature this 14th day of July, A. D. 1883.

CHARLES JOHN HEXAMER.

Witnesses:
RICH. F. BOEHME,
JOSEF EDELMANN.