(No Model.) 2 Sheets—Sheet 1.

L. WAGNER.

SAFETY DEVICE FOR MILLS.

No. 459,352. Patented Sept. 8, 1891.

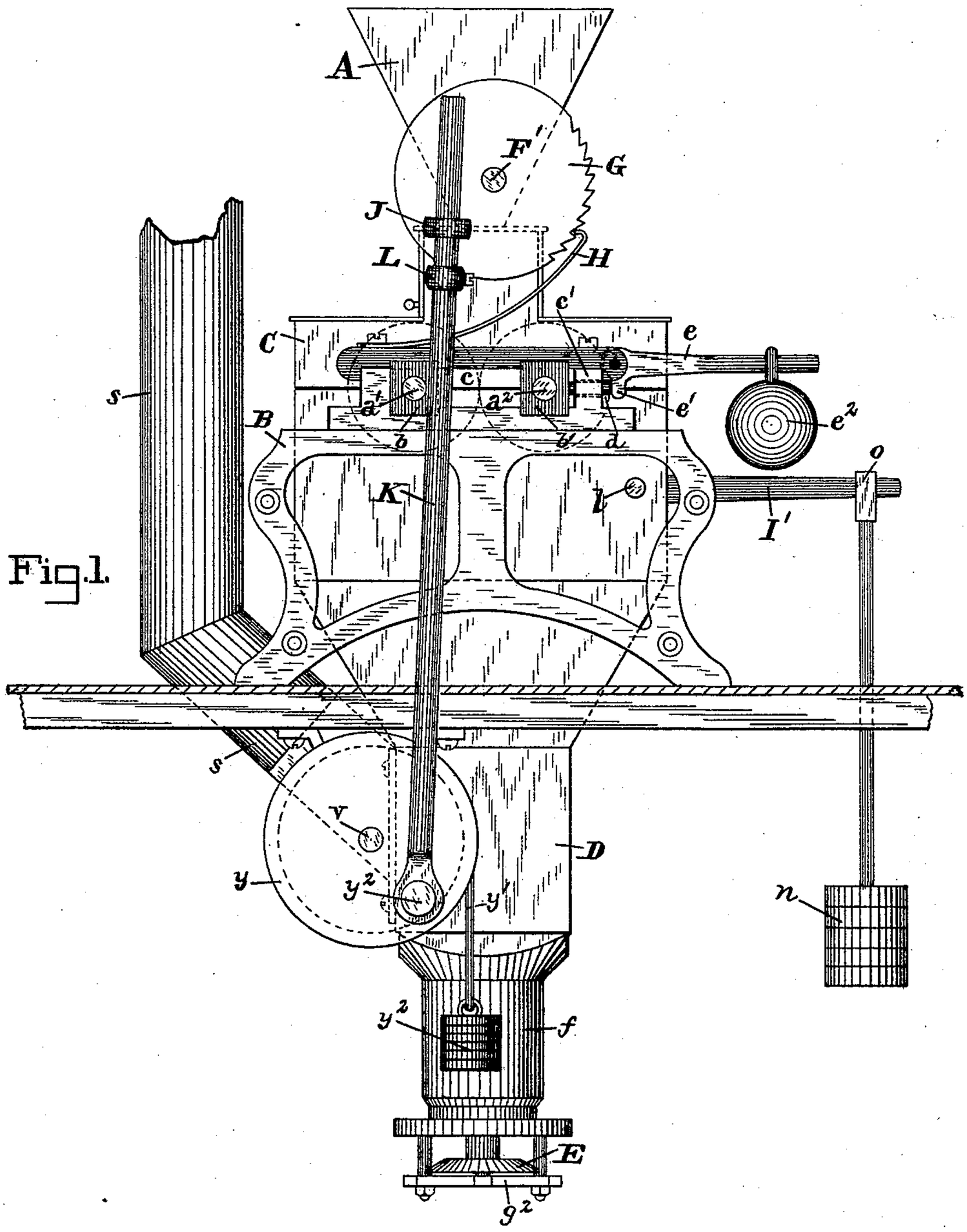

Fig. 1.

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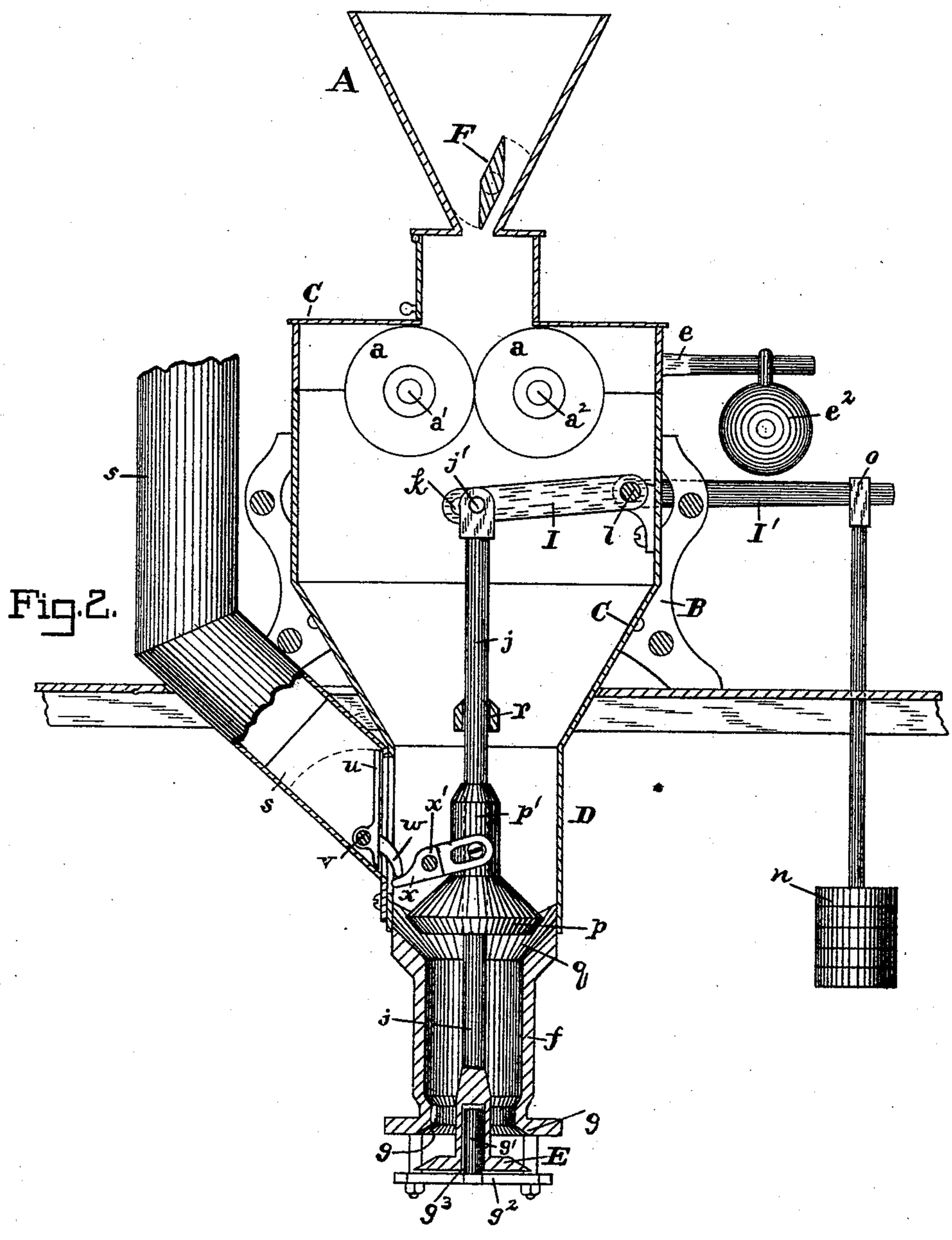
Fig. 2.



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INVENTOR:

Louis Wagner

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UNITED STATES PATENT OFFICE.

LOUIS WAGNER, OF BALTIMORE, MARYLAND, ASSIGNOR OF ONE-HALF TO JOHN MARR, OF SAME PLACE.

SAFETY DEVICE FOR MILLS.

SPECIFICATION forming part of Letters Patent No. 459,352, dated September 8, 1891.

Application filed March 15, 1890. Renewed May 7, 1891. Serial No. 391,945. (No model.)

To all whom it may concern:

Be it known that I, LOUIS WAGNER, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Safety Devices for Mills, of which the following is a specification.

This invention relates to an automatic safety device for mills.

The invention has for its object to provide mechanism for avoiding the damage that follows an explosion, and also to prevent fires that usually follow such explosions.

Referring to the accompanying drawings, Figure 1 is a side elevation of a roller-mill with the improvements attached. Fig. 2 is a vertical section of the same.

For the purpose of illustrating the invention an ordinary malt-mill is here shown.

The letter A designates the hopper of the mill.

a are the rollers or grinders, of any approved kind, inclosed in a case C, terminating in a funnel, and a conduit-pipe D leads from said case-funnel to an elevator or a receptacle. The case and hopper are supported by the frame B.

The journal a' of one roller *a* turns in a stationary box or bearing *b* on the frame B, while the journal a^2 of the other roller *a* turns in a movable box b', which rests in the horizontal slideway *c*. The journals at both ends of these rollers are mounted in the same way.

Both boxes b' of the movable roller have a side pin *d*, which passes freely through a hole indicated by broken lines in a post c' at the end of the slideway, and the end of said pin projects beyond the post. At each side of the case a lever *e* is pivoted adjacent to said post, and near the pivot has at its under side a right-angled lug or arm e', which bears against the projecting end of the side pins *d*. Each lever *e* has a weight e^2 attached. By this arrangement any hard foreign substance that may happen to be in the grain—like a nail or piece of metal—may pass down between the rollers *a*, because the roller whose ends a^2 are in the movable boxes b' may move sidewise, as the weighted levers *e* will tilt up when said hard substance gets between the rollers.

The conduit D has a contraction *f*, at the top of which a valve-seat *q* is formed for the plug-valve *p*. This valve has a tubular neck p', and the hanger-rod *j* passes loosely through this neck and also through a stationary guide-bar *r*, extending crosswise of the conduit. Thus the hanger-rod *j* may move up or down without affecting the plug-valve; or, on the other hand, the plug-valve may move up or down without affecting the hanger-rod.

At the lower end of the contraction *f* is an inverted shoulder or valve-seat *g*, and a vertically-movable valve E closes upward against this seat. A stud g' is fixed on a cross-bar g^2 and stands upright and enters a socket g^3 in the bottom of the valve E. This stud guides the valve. A hanger-rod *j* is attached to this valve E and projects upward, and its upper end is connected with an arm I within the case and mounted rigidly on a rock-shaft *l*, passing through the case C. The end of the arm I has a slot *k*, through which the joint-pin j' passes, thereby allowing of the necessary lost motion.

At the outer end of the rock-shaft *l* is attached a beam or arm I′, having a collar *o*, which is loose or adjustable along the beam, and a weight *n* hangs from said collar. This counterpoise-weight *n* will normally sustain the cut-off valve E and keep it elevated to its seat *g* and prevent the ground grain passing below, but the ground grain will accumulate above the valve E within the contracted part *f* of the conduit until the weight of such accumulated grain overbalances the counterpoise-weight *n*, when the cut-off valve E will descend sufficiently to allow the said ground grain to pass down. During the grinding operation, therefore, a certain quantity of ground grain will always be in the conduit above the valve E, and this quantity will fill the contracted part *f* and will serve to prevent gases or fire from passing downward. It will be seen, therefore, that the counterpoise-weight *n* must not only elevate and sustain the movable cut-off valves E, but must also sustain the weight of a predetermined amount of ground grain that will accumulate therein. In addition to this a plug-valve *p* is provided in the conduit about the cut-off valves to entirely close the conduit.

A vent-flue *s* connects with the conduit D

above the plug-valve and leads outside of the building and provides an outlet for the harmless escape of fire or the sudden expansion due to an explosion. This flue inclines upward and then passes up vertically, and where it joins the conduit has a flap-valve *u*, pivoted at *v*, at its lower part. When this valve is closed, it stands upright, as shown, and when open it falls to an inclined position within the vent-flue *s*. This flap-valve has at its lower edge an arm *w*, which projects toward the plug-valve *p* and serves the purpose hereinafter described. Attached to the neck *p'* of the plug-valve is one end of a lever *x*, which is pivoted on a rod *x'* extending across the conduit. When the flap-valve is closed, its arm *w* comes on top of the free end of the plug-valve lever *x*, as shown in Fig. 2, and its contact therewith keeps said free end down and thereby keeps the plug-valve *p* elevated or in the open position. When an explosion ensues, the vent-valve *u* will open and in so doing its arm *w* will set free the lever *x* and allow the conduit-valve to close.

The rock-shaft *v*, to which the flap-valve *u* is rigidly attached, has one end projecting through to the outside of the vent-flue, (see Fig. 1,) and to this outer end a pulley *y* is attached. A cord *y'* is on the rim of the pulley, and a weight y^2 is attached to and is pendent from the cord. The weight, cord, and pulley keep the flap-valve *u* normally closed, and if said valve should be forced open by an explosion these parts will, after the subsidence of the explosion, close the flap-valve again, and by the action of the arm *w* on the lever *x* will also raise and open the plug-valve *p*.

It will be seen that provision has been made by the valve E to retain a certain accumulation of ground grain in the conduit, to entirely close the conduit by the valve *p* when an explosion occurs, and to allow the sudden expansion or pressure due to an explosion to escape by the vent-valve *u*. In addition to these features the hopper A is provided in its bottom with a valve F, mounted on a rock-shaft F'. When this valve is turned one way, the bottom of the hopper is entirely closed, and no grain can pass down to the rollers. When the valve is turned the opposite way, (see Fig. 2,) grain can readily pass down from the hopper. This hopper-valve F is connected with the vent-valve *u*, so that upon the occurrence of an explosion the former valve will close simultaneously with the opening of the latter, and the supply of grain will be cut off from the hopper to the rollers or grinders.

One end of the shaft F' of the hopper-valve projects through the side of the hopper and has attached a ratchet-wheel G. A spring H, suitably secured, engages with the teeth of the ratchet-wheel and serves as a pawl. Thus this wheel can move one way, but not the opposite way, until the spring-pawl H is released.

The ratchet-wheel G has a crank-eye J, up through which a rod K passes loosely or freely. The said eye J is swiveled to the wheel G, so that while the rod K maintains its upright position through the crank-eye the wheel may turn.

A collar L is on the rod below the crank-eye and is retained thereon rigidly to its position by a set-screw. When this rod is moved upward, it will first slip through the eye J until the collar L comes in contact therewith. Then the farther-up movement of the rod will turn the wheel G and close the hopper-valve F. The lower end of the rod K is attached to a crank-pin y^2 on the vent-flue pulley *y*. By this combination of parts when the vent-valve *u* opens on the occurrence of an explosion the connecting parts—to wit, the pulley *y*, rod K, and wheel G—will close the hopper-valve F.

Instead of two grinding-rollers, four may be used.

This invention may be used in any kind of mill.

Having described my invention, I claim—

1. The combination of the conduit having an inverted shoulder or valve-seat *g*, a valve E below said seat and closing upward, a cut-off valve *p*, having a tubular neck and located above the valve first mentioned and closing by a downward movement, a hanger-rod *j*, attached to the first valve and passing loosely through the neck of the cut-off valve, a counterpoised arm I, supporting the hanger-rod, a pivoted lever *x*, having one end supporting the cut-off valve, a vent-valve *u*, rigidly attached to a rock-shaft provided with an arm *w* which comes in contact with the stem end of said lever, a pulley mounted on one end of said rock-shaft, and a weighted cord on the rim of the said pulley.

2. The combination of the conduit, a vent-flue connecting with the conduit, a vent-valve *u*, pivoted in said vent-flue, a pulley *y* in connection with the said valve, and a weighted cord on the rim of the pulley.

3. The combination of the conduit, cut-off valve in the conduit, a vent-flue connecting with the conduit, a flap-valve *u*, pivoted on a rock-shaft in said vent-flue, means for connecting these two valves, whereby the one is kept open while the other is closed, a pulley mounted on one end of said rock-shaft, and a weighted cord on the rim of the pulley.

4. The combination of a mill-hopper A, provided with a valve F, grinders below the said hopper, a vent-flue valve below the grinders, and connections between the said vent-flue valve and hopper-valve, whereby on the occurrence of an explosion the vent-flue valve will open and the valve in the hopper will close and cut off the supply of grain to the grinders.

5. The combination of a mill-hopper A, provided with a valve F, grinders below the said hopper, a conduit for ground grain, having a cut-off valve *p*, a vent-flue connecting with the conduit, a flap-valve pivoted in said vent-flue,

and connection between the said three valves, whereby the hopper-valve and cut-off valve will close when the vent-valve opens.

6. The combination of a mill-hopper A, provided with a valve F, grinders below the said hopper, a vent-flue valve below the grinders, a ratchet-wheel G to turn the hopper-valve, a crank-pulley turned by the vent-valve, a connection between the said ratchet-wheel and crank-pulley, and a pawl acting on the ratchet-wheel.

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

LOUIS WAGNER.

Witnesses:
JOHN E. MORRIS,
ED. RAINE.