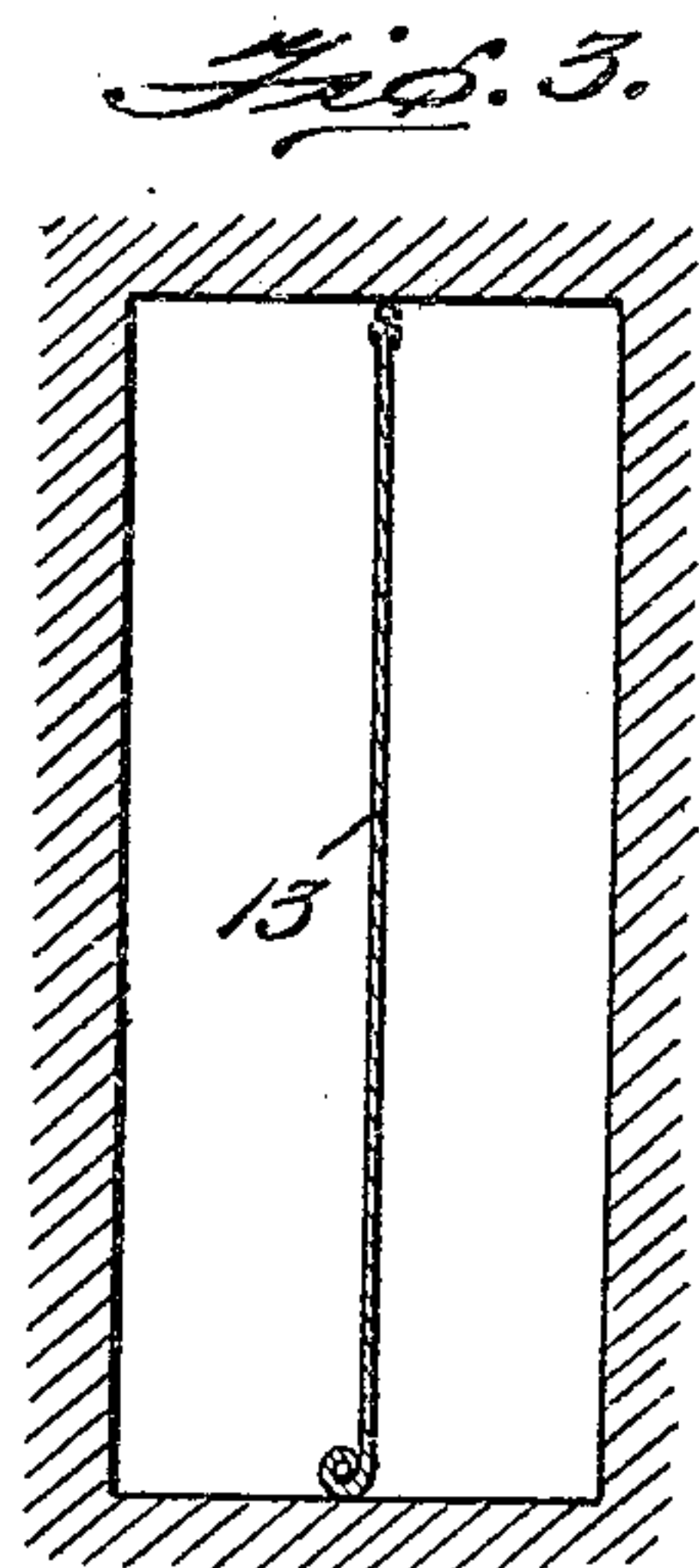
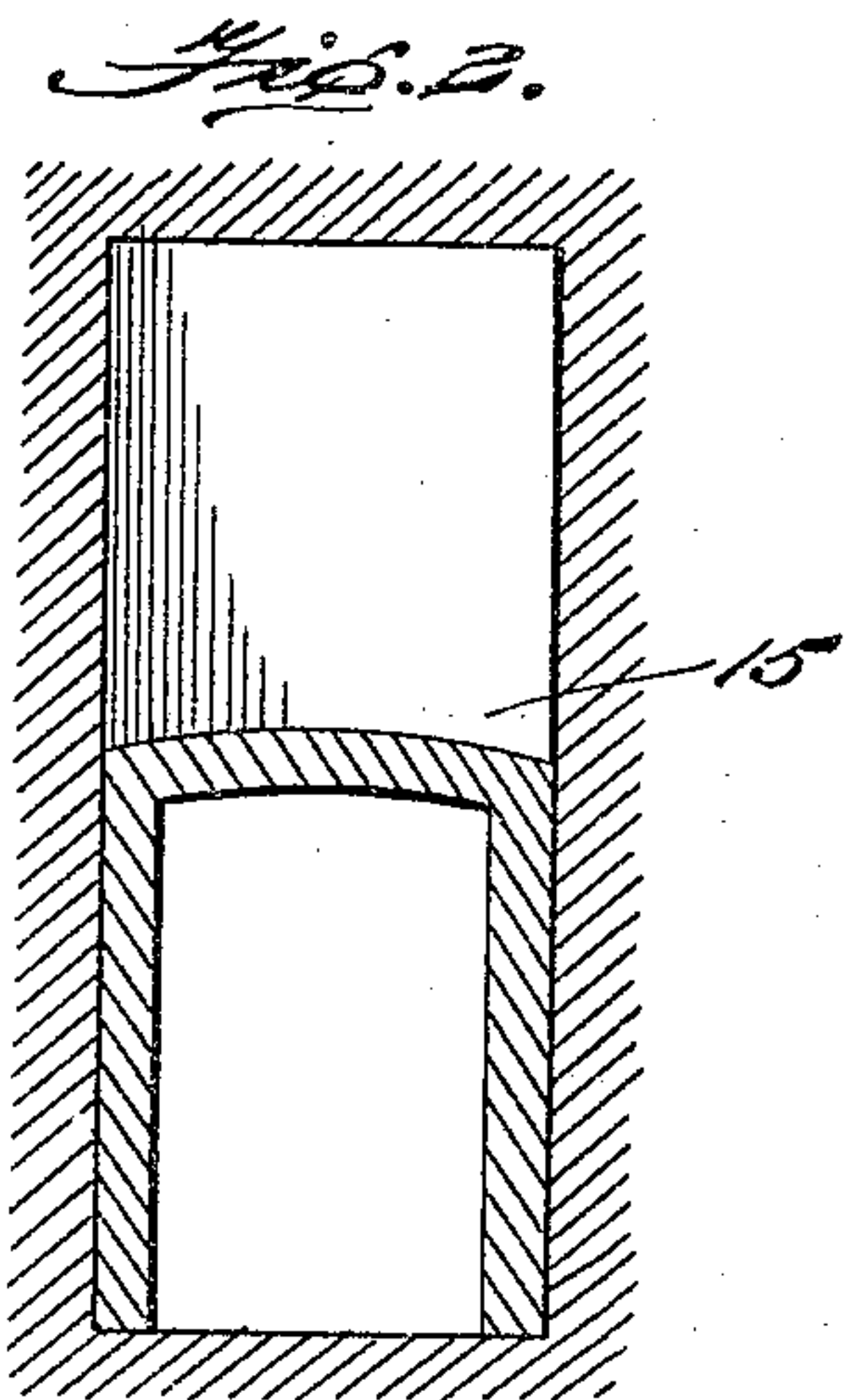
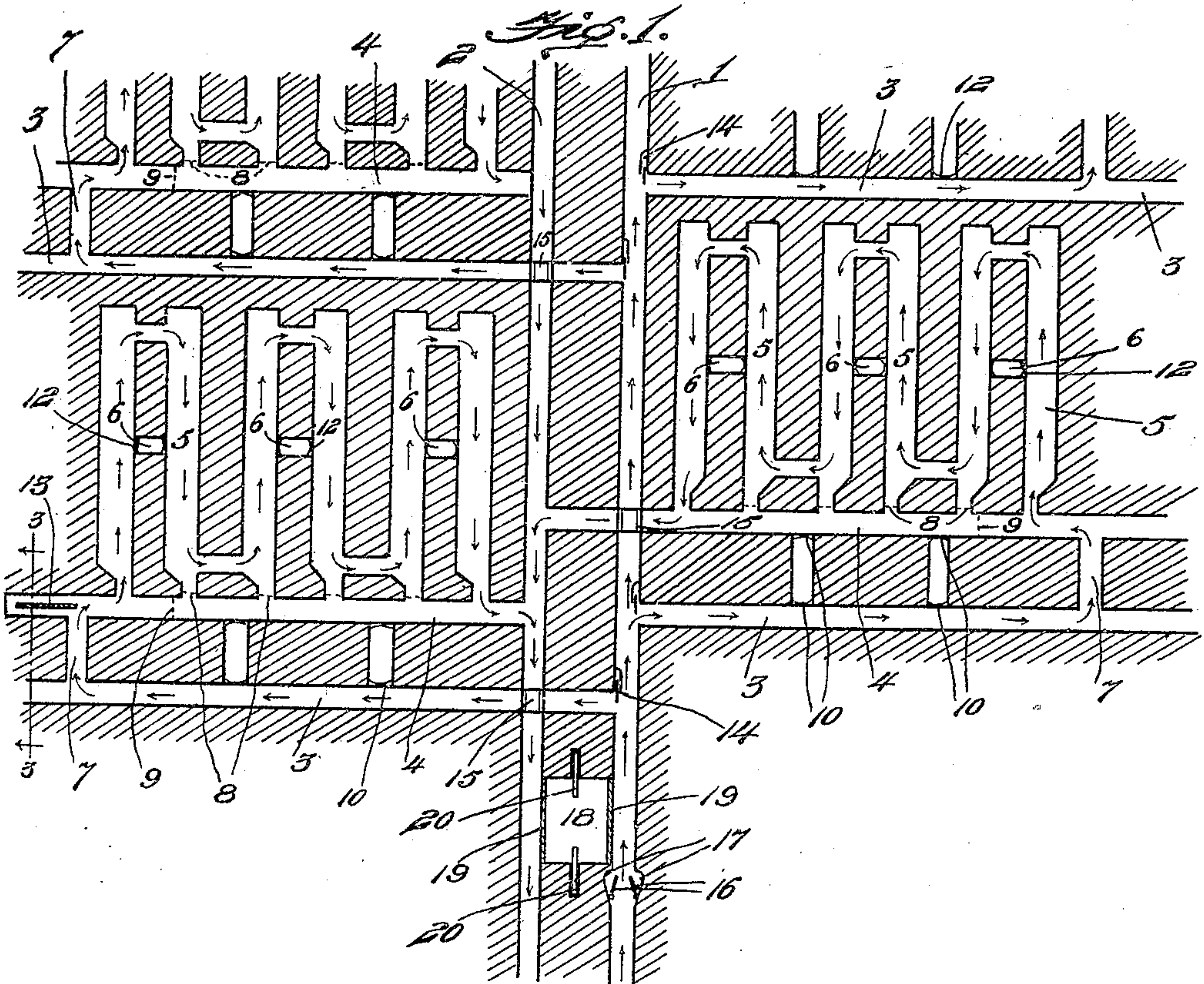


M. WARD.
VENTILATING SYSTEM FOR MINES.
APPLICATION FILED APR. 12, 1909.

942,950.

Patented Dec. 14, 1909.



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UNITED STATES PATENT OFFICE.

MARTIN WARD, OF HOUTZDALE, PENNSYLVANIA.

VENTILATING SYSTEM FOR MINES.

942,950.

Specification of Letters Patent. Patented Dec. 14, 1909.

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To all whom it may concern:

Be it known that I, MARTIN WARD, a citizen of the United States, residing at Houtzdale, in the county of Clearfield and State of Pennsylvania, have invented certain new and useful Improvements in Ventilating Systems for Mines; and I do 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 improvements in ventilating systems for mines.

The object of the invention is to provide a system of ventilation by means of which fresh air will be caused to circulate through all parts of the mine workings so that the miners in one section of the mine will not be compelled to breathe the air used by miners in another part of the mine.

Another object is to prevent the accumulation of gas in dangerous quantities.

With the foregoing and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a diagrammatic plan view of a mine illustrating my improved system of ventilation; Fig. 2 is a sectional view, showing the manner in which the currents of air coming in one direction are enabled to cross other air currents; Fig. 3 is a vertical section on the line 3—3 of Fig. 1, showing the arrangement of the temporary partitions provided to create a circulation of air at the end of a working, before a cross cut has been formed.

Referring more particularly to the drawings, 1 and 2 denote the main passages of the mine, the passage 1 serving as a main air inlet conduit and the passage 2 as a main air outlet conduit. Connected with the main air inlet passage is a series of branch passages 3 which serve as branch air inlet conduits to conduct the air back to the working in the mine. Connected to the main air outlet passage 2 is a series of branch passages 4 which serve as branch air outlet conduits, by means of which the air is conducted from the mine workings to the main air outlet passage.

With the branch air outlet passages are connected the rooms 5 from which the coal is being removed and the various rooms

along the branch air outlet passages 4 are connected together by cross cuts 6. The branch air inlet passages 3 are connected with the last room of each series by a heading 7, new headings being formed and the old ones closed, as additional rooms are worked out along the passages 4 so that the air in passing through the branch air inlet passages will continue through the last heading and enter the last room of each series and from the last room will pass to the other rooms of the series through the cross cuts 6 connecting the rooms and will pass out through the first room of the series and into the branch discharge passages 4, by means of which the air is conducted to the main discharge passages 2 and passes from the mine.

The connection between the various rooms of each series with the branch outlet passages, with the exception of the first room and the last room, are closed by doors 8, which may be formed of any suitable material. The air outlet passages are also closed by doors 9 adjacent to the connection of the last room therewith so that the fresh air from the branch air inlet passages will be caused to enter the last room through the last heading of each pair of branch air inlet and outlet passages. As the work in the various series of rooms progresses and new headings are formed between the pairs of branch passages, the old headings connecting said passages are closed by stoppings or brattices 10 which are preferably formed of concrete masonry and are arch-shaped or concaved on their inner sides and have their edges set into the adjacent walls of the headings. This construction of the stoppings or brattices enables them to withstand the pressure caused by explosions in the mines and also prevents holes being formed therein by rats. These brattices or stoppings are arranged at each end of the headings, thus preventing the formation of recesses or pockets where gas might collect or accumulate.

As the various rooms of each series are worked out and the material removed therefrom, new cross cuts 6 are formed between each alternate pair of rooms and the old cross cuts closed by means of brattices 12 which are arranged at each end of the cross cuts to prevent the formation of pockets in which the gas might accumulate. While the

last rooms are being formed, or while the work is being carried on at the ends of the branch passages, before the new cross cut or heading is formed, I preferably divide these
 5 end workings or rooms by a centrally arranged partition 13 which is preferably formed of canvas and extends through the center of the room or passage and is suspended from the ceiling in any suitable manner, thus dividing the room or passage into
 10 two parts, so that the air when entering the same, will pass up one side of the partition and around the inner end of the same and back to the opposite side, thus providing for
 15 a circulation of air through the ends of the new rooms or workings.

At the ends of each of the branch air inlet passages, where the same communicate with the main air passage are arranged suitable doors 14 which may be opened and
 20 closed to the desired extent for regulating the passage of air to the branch inlet passages and the rooms connected therewith. Where it is necessary for the branch air inlet and outlet passages to cross the main inlet or outlet passages in making proper connections therewith, I provide "overcasts"
 25 15 which are in the form of arches arranged in the main inlet and outlet passages, as shown, in Fig. 2 of the drawings. By means of the arches or "overcasts" 15, the air from the branch passages will be conducted through the main passages, as will be understood.

35 Arranged in the air inlet passage, adjacent to the entrance of the mine are hinged doors 16 which are adapted to swing back into recesses 17 in the sides of the passage 1 and are normally held open by the pressure of the
 40 air passing into the mine through the main inlet passage 1. Should an explosion occur in the mine, the back pressure of the air caused by the explosion will automatically close the doors 16 and thus prevent the force
 45 of the explosion from reaching the fan and thereby injuring the same. In order to relieve the pressure occasioned by the explosion and to permit the gas and air to escape, I preferably connect the main inlet and outlet passages 1 and 2, adjacent to the
 50 doors 16 by a passage 18, the ends of which are closed by a light frame work 19 of any suitable construction, which will be readily blown out by the force of the explosion, after the doors 16 are closed, thus permitting
 55 the gas and air to pass out through the discharge or outlet passage 2. After the gas and foul air resulting from the explosion, has passed out through the passage 18, the
 60 latter is closed temporarily by means of sliding doors 20 which are arranged in recesses formed in the opposite sides of the passage 18 midway between its ends. By thus arranging the doors 20, the inlet and
 65 outlet passages 1 and 2 may be quickly separated

after an explosion, enabling the circulation of air to be continued through the mine.

The course of the air through the several passages and rooms is indicated in the drawings by means of arrows and from the description, it will be readily seen that each series of rooms is independently supplied with fresh air which is conducted directly to the point where the workings are being made
 70 so that the men in one section of the mine are not compelled to breathe the air being used by the men in the other sections of the mine. This arrangement also prevents the
 75 air from accumulating gas in sufficient quantities to cause dangerous explosions, as is frequently the case when the same air passes continuously through the mine and is repeatedly breathed and exhaled so that before reaching an exit it has become heavily
 80 laden or charged with gas and thus forms a dangerous element.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the
 95 principle or sacrificing any of the advantages of the invention, as defined in the appended claims.

Having thus described my invention, what I claim is: 100

1. In a system of mine ventilation, a main air inlet passage, and a main air outlet passage, a series of branch air inlet and outlet passages connected with said main passages, series of rooms connected with each of
 105 said branch inlet and outlet passages, means whereby the air from said branch inlet passages is caused to independently circulate through each series of rooms and to be discharged therefrom into said branch outlet
 110 passage and to be conducted thereby to the main outlet passage, doors arranged in said main inlet passage, said doors being held open by the pressure of air entering through the passage and adapted to automatically
 115 close by the back pressure of air from an explosion in the mine, and means whereby the pressure of air caused by the explosion is released after said doors are closed.

2. In a system of mine ventilation, a main
 120 air inlet passage and a main air outlet passage, a series of branch air inlet and outlet passages connected with said main passages, series of rooms connected with each of said branch inlet and outlet passages, means
 125 whereby the air from said branch inlet passages is caused to independently circulate through each series of rooms and to be discharged therefrom into said branch outlet passage and to be conducted thereby to the
 130

main outlet passage, doors arranged in said main inlet passage, said doors being held open by the pressure of air entering through the passage and adapted to automatically close by the back pressure of air from an explosion in the mine, an air relief passage connecting said main inlet and outlet passages, a frame work to close the opposite ends of said passages and adapted to be blown out by the pressure of air and gas after said doors are closed, and temporary doors arranged in said relief passages to close the same after an explosion.

3. In a system of mine ventilation, a main inlet passage and a main outlet passage, a series of branch air inlet and outlet passages connected with said main air inlet and outlet passages, headings to connect said branch passages, stoppings or brattices arranged at each end of said headings to close the same and prevent the formation of gas accumulat-

ing pockets therein, a series of rooms connected to said branch passages, a series of cross cuts between certain of said rooms to provide for the circulation of air from the same, brattices arranged in each end of said cross cuts to close the same and prevent the formation of gas accumulating pockets, and doors arranged in said rooms and branch outlet passages to close the same thereby causing the air from the branch inlet passages to circulate through the rooms of each series and to be conducted to the main air outlet passage without entering the rooms of any other series.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

MARTIN WARD.

Witnesses:

GEO. CHARLTON,
FERD. TODD.