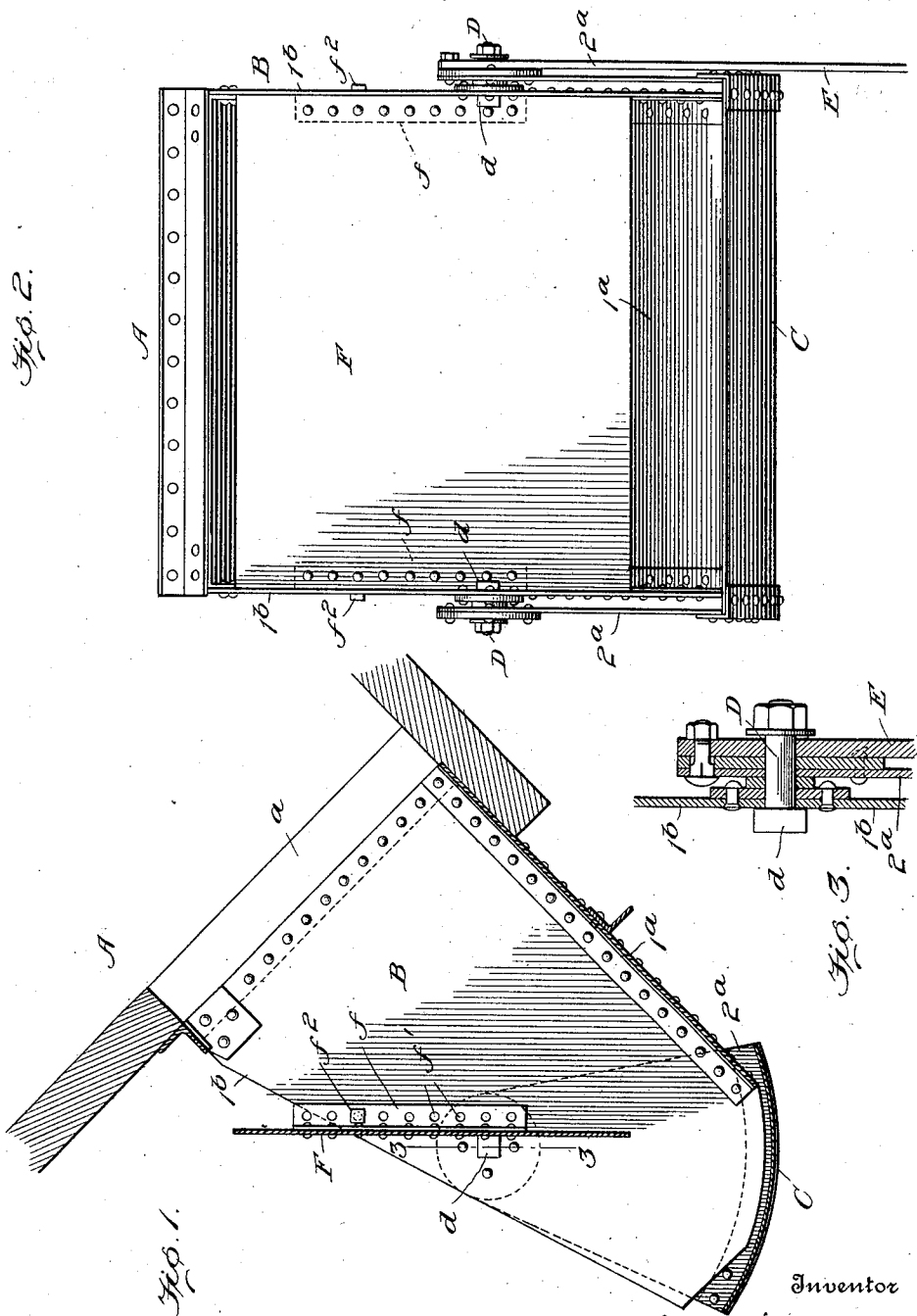


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DISCHARGE SPOUT FOR BINS AND CHAMBERS.
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DISCHARGE-SPOUT FOR BINS AND CHAMBERS.

1,057,074.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, DAVID I. MILLER, a citizen of the United States, residing at Allens Creek, in the county of Wayne and State of Tennessee, have invented certain new and useful Improvements in Discharge-Spouts for Bins and Chambers; and I do hereby 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.

My invention relates to the construction of discharge spouts for bins and chambers provided for the storage of materials used in the industrial arts, and where the quantity to be drawn from time to time will vary, and requires to be measured or weighed in the receiving vessel at the time drawn.

As is well understood by those skilled in the industrial arts, it is desirable to store various materials such as coal, coke, ores, broken stone, clays, &c., in large quantities, but in such manner that small and regulated quantities may be drawn off from time to time, as for instance when charging blast furnaces, or in like cases where a charge is made up of different materials in relative proportions either by measurement or weight. It is also well understood by operators that owing to the sizes of the material and their individual characteristics, the size of the discharge opening in the storage bin or chamber will necessarily vary and in many instances will necessarily be of large area, consequently in order to avoid overflow or leakage the spout leading from the discharge opening of the chamber to the point of delivery must be correspondingly large. With all such spouts a gate or cut-off is employed to check the flow of material, and when the flow of material is checked a pack or arch of material is formed in the bin at the discharge opening thereof, which pack or arch is thereafter broken, either automatically or by the use of a suitable instrument, when next the cut-off or gate is opened. Under the usual conditions, and with the usual or present construction and arrangement of delivery spouts, when the gate is opened and the arch or pack broken at the discharge opening of the chamber or bin the flow of material is so large and the pressure thereof so great that in the case of a small or relatively small receiving receptacle there will be a severe shock to the re-

ceptacle, an overflow of the receiver, and in case of a scale there will frequently be a great excess in weight before the gate can be closed and the flow of material arrested.

The object of my present invention is the provision of a spout for the delivery opening of a storage chamber or bin the construction of which will meet all the requirements of a large delivery opening and a thoroughly controlled flow of material.

To this end, my invention generally stated consists in the combination with a delivery spout of a diaphragm interposed between the gate or cut-off and the delivery opening of the storage chamber or bin and arranged at such an angle to the bottom of the spout as will tend to induce an arching of the material in the spout in advance of the discharge opening of the bin, whereby the arch-action is in a measure transferred from the delivery opening of the storage chamber to a point near the cut-off, and said arch-action as well as the pressure on the cut-off minimized to control the flow of the material near the point of delivery, and measurably relieve the cut-off of the load or pressure of the material in the storage chamber.

There are other, minor, features of invention, all as will hereinafter more fully appear.

In the drawings chosen for the purpose of illustrating my invention, the scope whereof is pointed out in the claims, Figure 1 is a longitudinal, vertical central section of a delivery spout embodying my invention, shown in connection with the delivery opening of a storage chamber or bin; Fig. 2 is a front elevation of the delivery spout shown in Fig. 1, and Fig. 3 is an enlarged section of a portion of the side-wall of the spout and of the cut-off or gate, taken in the plane of the line 3—3 Fig. 1, the pivot pin of the cut-off being shown in elevation.

Like symbols refer to like parts wherever they occur.

I will now proceed to describe my invention more fully so that others skilled in the art to which it appertains may apply the same.

In the drawings, A indicates a portion of a storage chamber or bin, having a delivery opening *a*, the size of which will of course depend on the size of the particles and character of the materials contained in the storage chamber whether the same be coal, coke, broken stone, clay or any other material used

in the industrial arts, and which is required to be measured or weighed as drawn from the chamber.

B indicates a delivery spout secured to the storage chamber at the delivery opening thereof, which spout will be of such size or proportions as will accommodate the flow of material without leakage or overflow. In the present instance this delivery spout is shown as constructed of sheet metal plates and angle irons connected by suitable rivets forming the bottom 1^a and side walls 1^b of the spout or chute, but the material of which the spout is constructed involves no part of the present invention and may therefore be selected to suit controlling conditions or the wish of the constructor.

C indicates a gate or cut-off for closing the outlet end of spout B, which gate may be of any desired construction but is preferably a swinging or pivoted one having the side sections 2^a by means of which it is suspended from pivots D, which pivots may be in the character of square head bolts that pass through the side sections 2^a of the cut-off C and through the side-walls 1^b of the spout B.

E indicates a suitable lever for swinging the gate or cut-off C.

F indicates a diaphragm arranged vertically in the spout across the flow of the material therein at an oblique angle to the bottom of the spout and adjustably supported in position by means of the angle irons *f* riveted to the sides of the diaphragm. The angle irons are provided with a series of bolt holes *f'* through which and through bolt holes in the side-walls 1^b of the spout B pass suitable bolts *f*². This diaphragm which is suspended by the bolts *f*² is supported against the downward and outward thrust of the material flowing through the spout by the square heads *d* of pivot bolts D. If desired, any other of many well known ways may be adopted for rendering the diaphragm F adjustable. This diaphragm tends to induce the arching of the material in the spout and contracts the area of the spout or chute adjacent to the cut-off, and as all material must flow under it, and the amount of said contraction is adjusted according to the relative size of the particles and the character of the material contained in and to be drawn from the storage chamber or bin A the cut off is thus in a large measure relieved of the thrust or load of the material in the bin and the manipulation of the cut off is facilitated.

The operation of my devices is as follows: On account of the relatively large delivery opening *a* in the wall of storage chamber A the material flows into spout B without arching across the opening *a*. When the cut-off or gate C is closed a certain amount of the material flows under the diaphragm and comes to a rest against the cut-off C

filling it up according to the angle of repose of the material being discharged. A certain amount of arch-action may take place in the spout between the diaphragm F and the wall of the chamber A or storage pile and also at the delivery opening *a*, but it is evident that an essential part of the arch-action at the opening *a* in the wall of chamber A is the pressure against the material lying between the diaphragm F and the wall of the chamber which distributes such thrust partly to the diaphragm F and partly through the arch formed at the diaphragm, to the cut-off C. When, however, the spout is opened by revolving the cut-off C around its pivots D or fulcrum, the material in it falls out, which breaks the arch-action at the diaphragm F and the material begins to flow. This breaking of the arch-action at the diaphragm F and resulting flow of material breaks any arch-action at the opening *a* in the wall of storage chamber A by removing a portion of the arch at that point and the material begins to flow from the storage pile.

It will be noted that as a result of the interposition of the adjustable diaphragm between the storage chamber and the cut-off and adjacent to the cut-off the arch-action is divided up between the outlet of the storage chamber and the diaphragm, and that the small portion of the material which rests in the cut-off is under only a small portion of the total pressure due to the weight of the material in the storage pile, so that the manipulation of the cut-off is rendered easy and it may be so managed as to permit the discharge of only such small quantities of the material as may be required to fill a measure or turn a balance. Furthermore, though the small amount of material in the cut-off is the key for starting the flow of the material in the storage pile, yet by turning the cut-off but slightly a limited discharge of the material may be effected without setting up a movement of the material in the storage pile.

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

1. The combination of a storage chamber having a suitable discharge opening, a delivery spout leading therefrom, a fixed diaphragm arranged in said spout intermediate of the discharge opening of the storage chamber and the cut-off, said diaphragm terminating above the bottom of the delivery spout to maintain an open passage for material from the storage chamber and being arranged at an oblique angle to the bottom of the spout thereby tending to induce an arching of the material in the spout, and a cut-off arranged in the delivery spout below the diaphragm.

2. The combination of a storage chamber

having a suitable discharge opening, a delivery spout leading therefrom, a fixed diaphragm arranged in the spout adjacent to the cut-off, said diaphragm terminating
5 above the bottom of the delivery spout to maintain an open passage for the material from the storage chamber to the cut-off and being arranged at an oblique angle to the bottom of the spout thereby tending to in-

duce an arching of the material in the spout, 10 and a pivoted cut-off arranged in the delivery spout below the diaphragm.

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

DAVID I. MILLER.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."