A. T. Boon,

Flour Bolt.

No. 45,311. Patented Dec. 6. 1864.

Fig: 1.

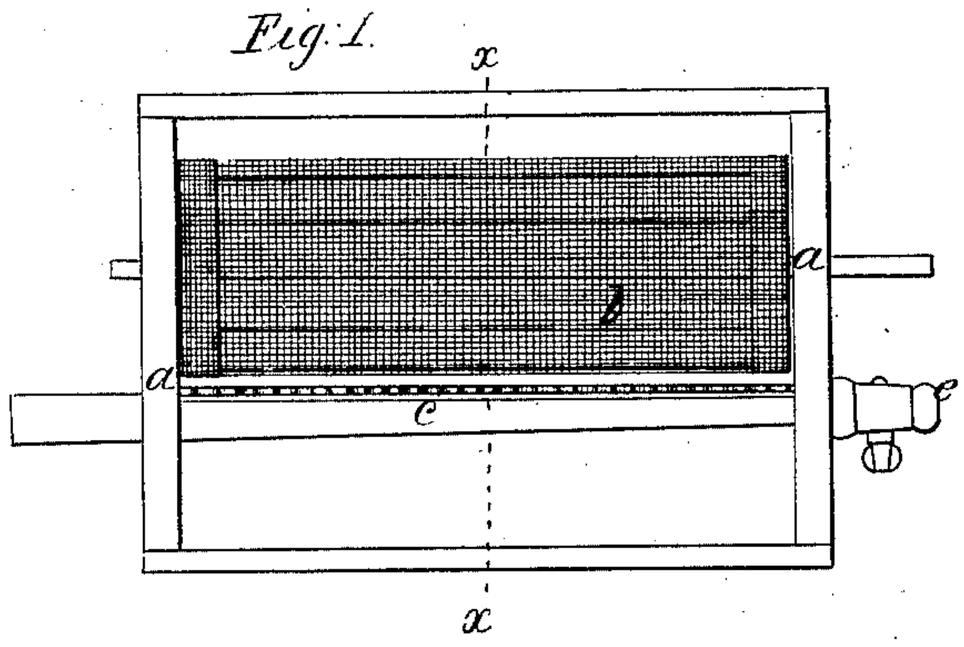


Fig: 2.

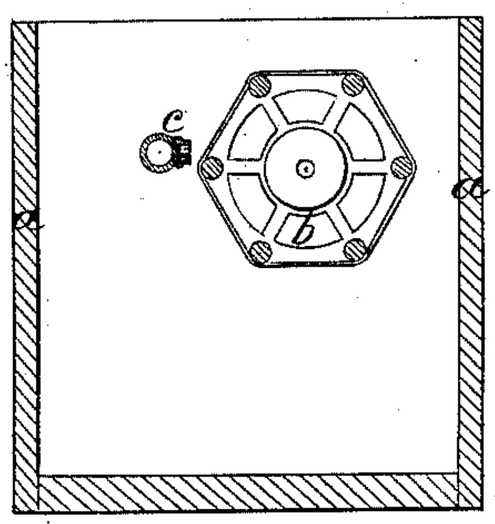


Fig: 6.

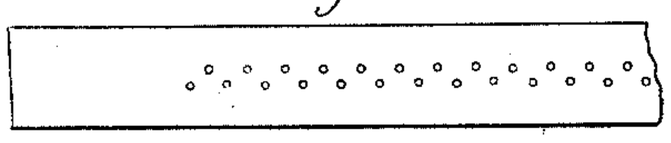


Fig: 5.

Fig: 7.

y

Fig: 3.

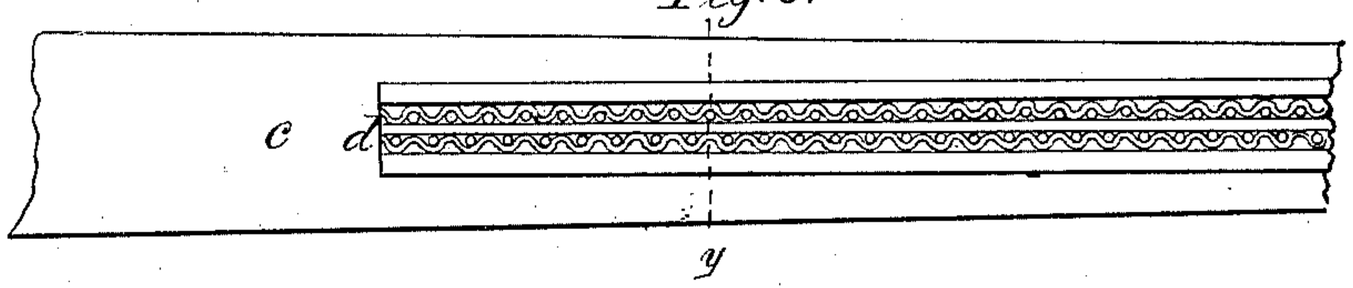
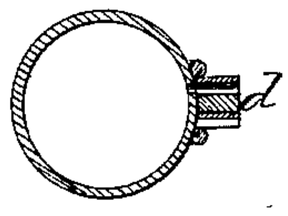


Fig: 4.



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UNITED STATES PATENT OFFICE.

ALONZO T. BOON, OF GALESBURG, ILLINOIS, ASSIGNOR TO HIMSELF AND CHARLES L. STEVENS, OF SAME PLACE.

Letters Patent No. 45,311, *dated December* 6, 1864.

IMPROVEMENT IN FLOUR-BOLTS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it remembered that I, ALONZO T. BOON, of the city of Galesburg, in the county of Knox and State of Illinois, have invented a new and useful Improvement in Flour-Cooler and Bolt-Cleaner; and I do hereby declare the following to be a full and exact description of the construction and operation of the same, reference being had to the annexed drawings forming a part of this specification.

The nature of my invention consists of an apparatus for cooling the flour at the same time that it keeps the meshes of the bolting-cloth open, thereby becoming not only a substitute for what are known in milling as the "hopper-boy" and "cooling-chest," but acting an important part in freeing the bolting-cloth from the obstruction to which it is necessarily liable from the accumulation of the flour in the meshes of the cloth.

In the drawing hereto attached, Figure 1 is a vertical view of a bolt and my apparatus as seen together in the bolting-chest; Fig. 2, a transverse section thereof through a plane indicated by the line *x x* of Fig. 1. Figs. 3, 4, 5, 6, and 7 are fractional or sectional views of the air pipes or tubes which are used in my invention, which figures will be more fully explained hereafter.

Many devices have been presented for cooling flour after passing from the grinding apparatus, among which those in most common use are the hopper-boy and cooling-chest. Some of these are slow in their operation, complicated in their arrangements, and all of them, so far as I know, are intended to produce the effect contemplated before the flour reaches the bolting-cloth. My device simplifies this operation by requiring the flour to pass as soon as may be from the stones or grinding-surfaces to the bolting apparatus, when a current of air of any required temperature, and relieved, if need be, of all or a greater part of its hydroscopic moisture, is made to mingle directly with the flour, and thus not only cool it effectually, but remove from it the moisture from the grain, which goes over with it from the stones or grinding-surfaces. Moreover, by passing through the meshes of the bolting-cloth with some force, it keeps these cleared of the flour liable to accumulate in them, and thus enables the cloth to perform its functions more rapidly and more effectually than is now done.

In Figs. 1 and 2, *a* is the chest. *b* is the bolt, and *c* the air-pipe. When the whole is in operation, the flour passes into the bolt *b*, and a current of air is forced into the air-pipe *c*. This latter, being furnished with suitable apertures on its side, discharges its contained air through these apertures, and thence through the meshes of the cloth into the bolt, where it mingles with the flour, and, abstracting from it its excess of heat and moisture, reduces it to, or near to, its own temperature, and then escapes through the sides or meshes of the cloth. It is obvious that in doing this the air must pass twice through the cloth—first, by the force given it from the air-pipe, and, second, as it escapes therefrom. In each of these transits through the cloth, it must necessarily act so as to cleanse the meshes of the cloth, and, by keeping them free from the fine material that has a tendency to accumulate upon the threads, greatly increase the quantity of flour it can bolt in a given time. The orifices of the air-pipe open upon and near to the outer surface of the bolting-cloth, as seen in Figs. 1 and 2, and as the bolt revolves on its axis the cloth receives successively the effect of the blast upon its entire surface, both in its ingress and egress. The air may be propelled into the tube *c* by a fan-blower, or any form of blower having an exit or exhaust pipe connecting it with or to the said tube. In cool or cold weather, the air at its ordinary temperature may be used; but in warm weather, it will be advantageous to take the air from some cool place; and, indeed, it may be advisable to cause it to pass through a refrigerating apparatus of some kind by means of a fan-blower or some similar apparatus. Summer air, it is well known, is always charged with a large amount of aqueous vapor. By cooling it in the manner proposed before propelling into the bolt, so much of this vapor may be condensed that air thus treated will be as efficient in cooling and drying the flour as the air of a cold winter day. The miller has thus the means at all times of regulating the drying of his flour to suit the character of his wheat and the climate or temperature to which it may have to be ex-

posed, without regard to the season of grinding or milling.

I have devised several plans of using this artificial blast as a cooler of the flour, as well as a cleanser of the bolt-cloth. In all of them, however, I contemplate using the air in small jets, because in this form it impinges more sharply (if I may use the term) upon the bolting-cloth, cleaning the meshes more successfully than can be done by a broad or open blast. One of these plans is seen at *c* in Fig. 1, and an enlarged view of the same in the fragment represented in Fig. 3. In this plan the tube is slightly conical, its larger end being toward and properly connected with the blowing apparatus, and having its smaller end closed by a stop-cock or valve, *e*. The orifices for the discharge of the air upon the bolt-cloth in this plan are made, as seen at *d*, Fig. 3, by interposing two corrugated plates between three plain ones, and applying these over a slot or series of openings in the side of the pipe *c*. By this plan the orifices between the flat and oval plates form jets arranged in zigzag or quincunx, nearly.

By means of the stop-cock or valve, any reasonable excess or pressure of air in the tube may be regulated without interfering with the action of the blowing apparatus.

In a plain cylindrical tube with orifices of this or almost any other form, there would not be a uniform strength of blast through these orifices from one end of the tube to the other. It is to obviate this—that is, to secure a uniform strength in all the jets—that I make the tube slightly conical.

Fig. 4 is a cross-section of Fig. 3, along a plane represented by the line *y y* of the latter figure. From this section, Fig. 4, it will be seen that the tube *c* is entirely hollow, and that the air has free access to all its sides from end to end. If the tube were cylindrical, so much of the pressure of the air would be taken off by the escape from the orifices or jets nearest the blower that the strength of the blast of those more remote would be greatly diminished.

In Fig. 5 is exhibited another mode of accomplishing this equalizing of the strength of the jets throughout the whole length of the tube, by which the tube may be made cylindrical throughout its whole length. In this plan the cylinder is divided by a series of diaphragms extending entirely across the tube, in such relation to each other that a cross-section of the tube will show that these diaphragms divide it up into orifices of equal area. These diaphragms are designated by *l l l l*, and it will be seen that they lead to chambers *l' l'*, &c., inclosing an equal number of jets in the side of the tube. By this arrangement, although there may be a slight difference in the strength of the blast from the orifices of each chamber as a whole, they will be as nearly as possible equal through the whole tube.

In Fig. 6, two rows of orifices in the pipes are shown arranged in zigzag. These orifices may be either round, as shown in this figure, or they may be short slots.

Fig. 7 is a section showing the mode of applying tubes to these orifices, if desired; but a more simple plan would be to punch these orifices from within outward, by which the burr projecting from the surface will itself produce the pipes with sufficient accuracy. This mode of making them, however, can only be used when the tube itself is made of some thin metal.

When wood is used, it may be better to introduce pipes in the orifices, as shown in Fig. 7.

In manufacturing these tubes, I do not confine myself to any particular material, nor to any particular size or form of the cross-section. Tin, sheet-iron, or copper will generally be found the most convenient; but wood, vulcanized rubber, and the like may be used. The length, of course, will be determined by that of the bolt—the diameter about ten inches, more or less, as may be required.

In the drawings, the tube is represented round; but it may be made square, triangular, octagonal, or of any other form to suit the taste, or fancy, or convenience.

Having thus fully set forth the nature of my invention, what I claim therein, and desire to secure by Letters Patent of the United States, is the following:

1. The use of a blast of air of the ordinary temperature of the atmosphere or below it, applied to the exterior of a bolting-cloth or similar apparatus, for cooling and drying the flour or other powdered material therein, and for clearing or cleaning the meshes of the bolting-cloth.

2. The conical pipe with its lines of orifices and stop-cock *l*, as shown in Figs. 1, 3, and 4, or the cylindrical pipe with its orifices or diaphragms, as shown in Figs. 5, 6, and 7, for applying a blast of air in jets to the outer surface of a bolting-cloth, for cooling and drying the flour or other powder therein, and for clearing and cleaning the meshes of the bolting-cloth, substantially as described.

ALONZO T. BOON.

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ASA A. MATTESON.