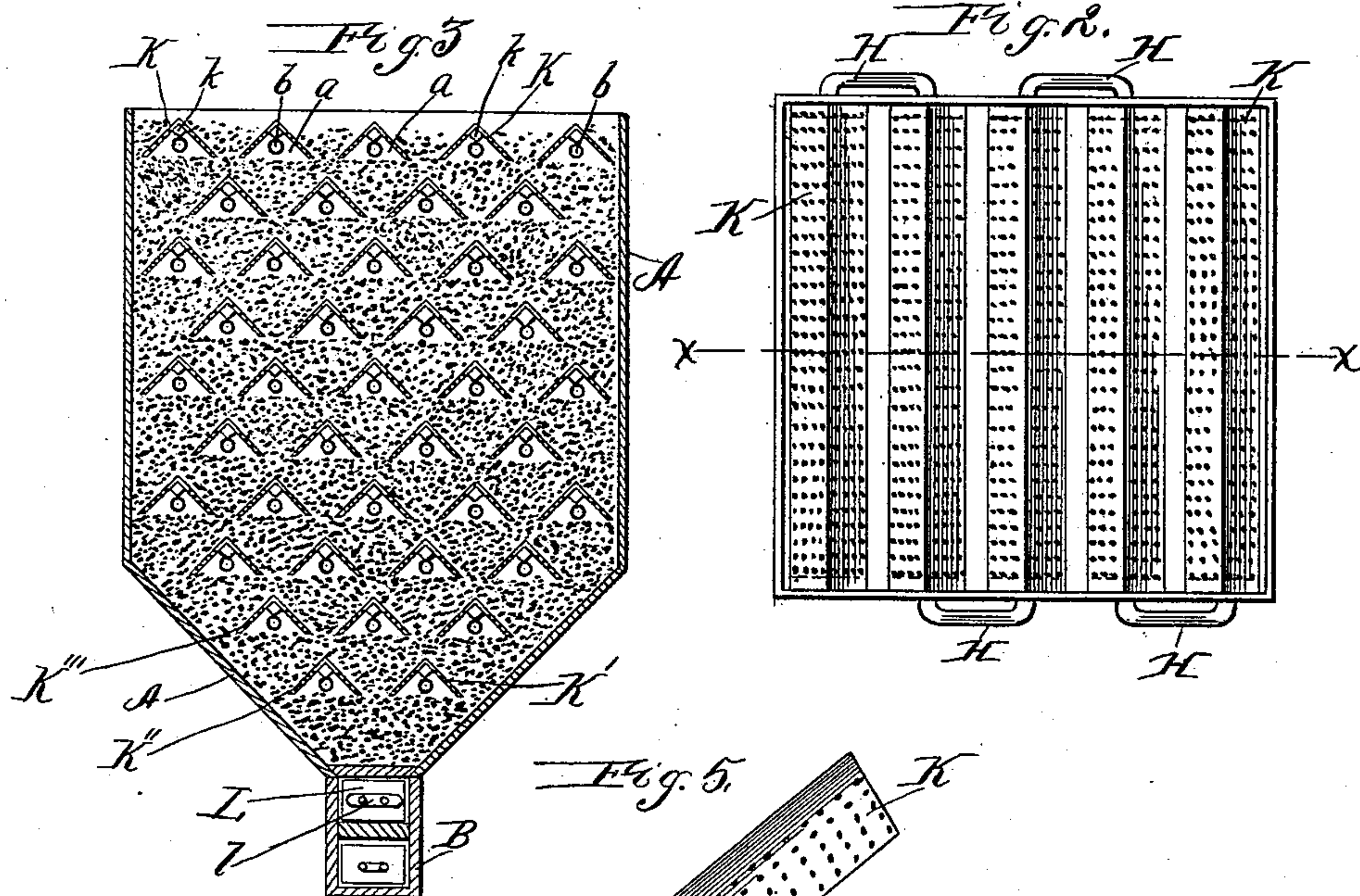
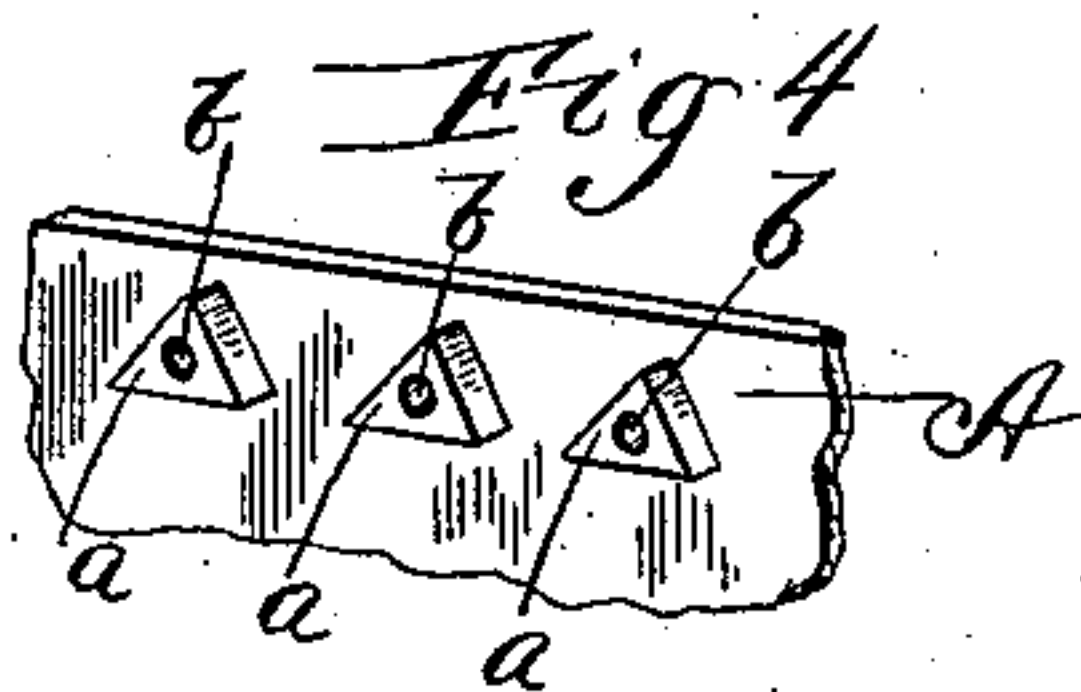
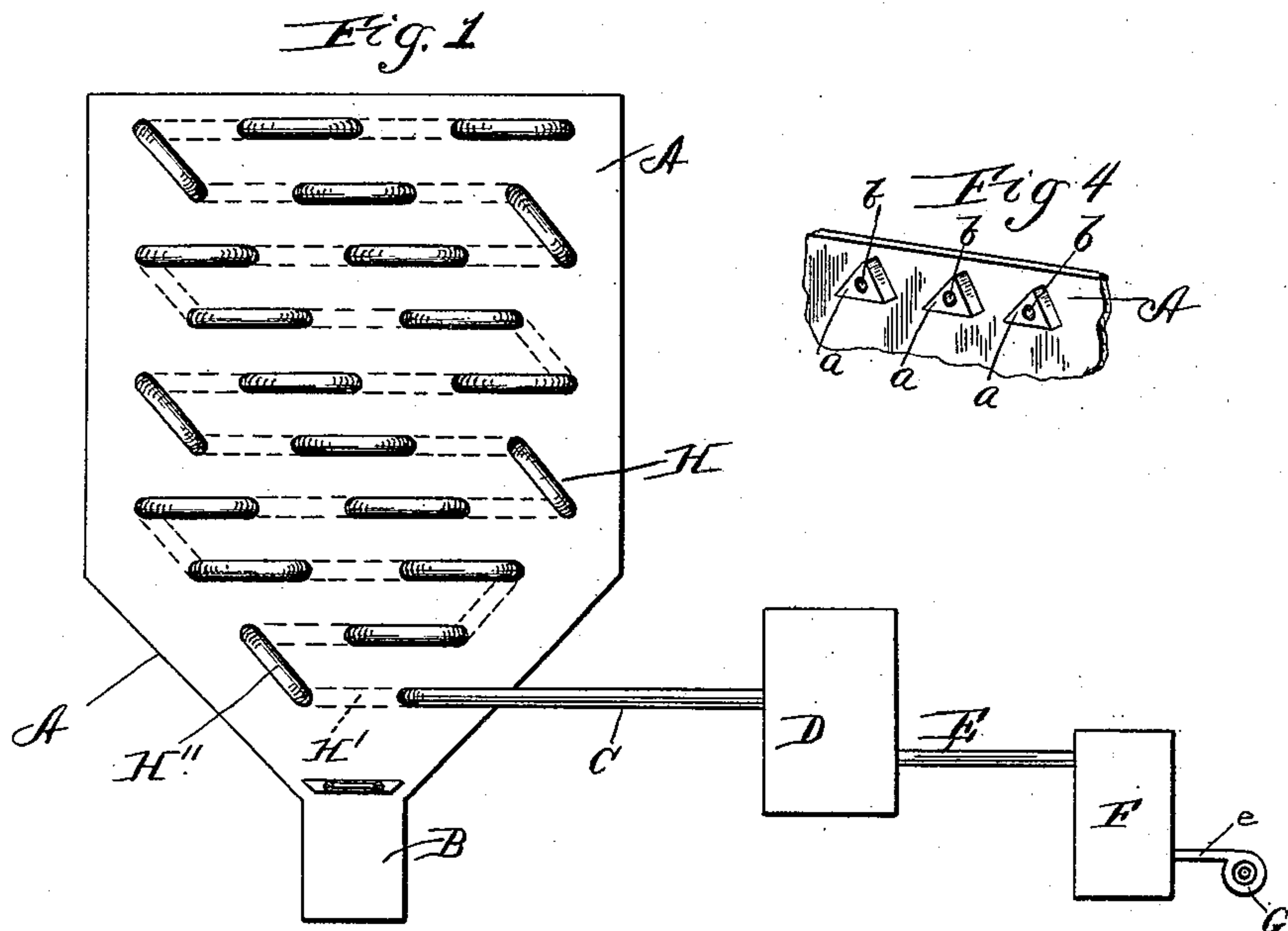


(No Model.)

W. McKEE.
GRAIN DRIER.

No. 488,770.

Patented Dec. 27, 1892.



Witnesses:
S. M. Rheem.
W. F. Lanning

Inventor:
William McKee
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UNITED STATES PATENT OFFICE.

WILLIAM MCKEE, OF CHICAGO, ILLINOIS.

GRAIN-DRIER.

SPECIFICATION forming part of Letters Patent No. 488,770, dated December 27, 1892.

Application filed August 22, 1892. Serial No. 443,724. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MCKEE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Grain-Driers, of which the following is a specification.

My invention relates to improvements in grain driers, which may, also be employed to dry other material than grain.

Its object is to provide for the more effective, uniform and perfect drying of grain and other material. I attain this object by means of the mechanism shown in the accompanying drawings in which like reference letters refer to the same parts throughout.

Figure 1 represents an end elevation of my improved drier having exterior connection with air heater and blower; Fig. 2 is a top plan view of my improved drier; Fig. 3 is a vertical cross sectional view of my improved drier upon the lines $x-x$ of Fig. 2; Fig. 4 is a detail fragmentary view of the interior surface of one of the end walls of my improved drier with the supporting plates or brackets a in position; and, Fig. 5 is a detail view of one of the perforated inverted troughs.

One of the difficulties experienced in driers, and especially in grain driers, is the fact that the air (heated or not) cannot be carried uniformly through all portions of the mass to be dried; and where means have been adopted approximating uniformity in this particular, they have been of such a character as to require too great power to force the air through the mass and in this and other respects are expensive and unsatisfactory.

I am aware that driers have been constructed and operated by forcing a volume of air from a chamber located at one end of a bin of grain through a mass of grain therein, by means of a number of flues entering such air chamber and formed by inverted troughs and the surrounding grain. I do not claim that flues formed by inverted troughs and the surrounding grain, arranged upon the well known fact that the grain beneath the troughs will not, like liquids arise and fill the troughs, is new; but I do claim as new the connecting of said troughs alternately at opposite ends so as to embrace them all in one continuous flue whereby a small volume of air with light

pressure and at comparatively little cost can be made to accomplish the purpose of a large volume otherwise applied.

Letter A represents the shell or exterior wall of the bin or drier, the lower portion of the sides of which incline inwardly and terminate in a conveyer box B, in which is located the ordinary conveyer operated when desired by power. The inner surfaces of the ends of the bin or drier are provided with blocks or brackets a, a , permanently attached thereto upon which the inverted troughs K, K, may be placed and held in position. Preferably they are arranged as shown in series in horizontal lines, each lower series to be located intermediate those above, so that the troughs supported thereon will alternate in series as shown in Fig. 3. Openings b, b , are provided which pass entirely through the blocks or brackets a, a , and through the ends of the bin or drier; and these openings, alternating with those of the opposite ends of the bin or drier are connected with tight fitting pipes or tubes H, H, H, in such manner that the several series of troughs from K' up to the last constitute a connected and continuous path-way or tube when grain is in the bin or drier. Thus the pipe C proceeding from the blower and the heater, enters through the exterior wall of the drier and connects with the trough K' Fig. 3. The grain in the drier constitutes a floor or side to the inverted trough K'. At the opposite end of the drier the inverted trough K' is connected by a pipe H with the inverted trough K'', and again at the reverse end of the drier the trough K'' is connected by the pipe H'' with the trough K''', and so on through the series of inverted troughs until the last is reached.

I do not limit myself to the use of the blocks or brackets a, a , to support and hold in place the inverted troughs, as it is evident there are very many means of accomplishing this, it only being necessary that there shall be openings through the walls connecting the different troughs so as to make them continuous. Nor do I limit myself to troughs which are connected by external pipes and openings through the walls of the drier, for it is evident that these or similar connections, so as to make the troughs continuous may be made within the walls of the drier.

My invention consists in availing myself of the fact that grain and other material will not rise up and fill the spaces in inverted troughs, and thus make a connected series
5 of such troughs passing back and forth through the entire mass to be dried.

Fig. 5 shows a form of trough that I prefer to employ. The sides are perforated by small perforations, and are at about right angles to
10 each other. Where the troughs are to be supported in blocks or brackets as shown by *a, a*, Fig. 4, I prefer the sides to be supported by a block *k* to give it strength and prevent it yielding to the weight of grain. It is evident
15 that the trough may be semi-cylindrical, or possess other forms and it need not be perforated, but I prefer the form shown in Fig. 5 because it will permit the grain when entering the drier to pass or fall below freely
20 and the perforations permit the heated air to permeate the mass of grain more generally and uniformly.

Letter G represents an air blower, connected by the pipe *e*, with the heater F which connects with the chamber D, wherein the air
25 may be slightly retarded and lose some of its heat. The chamber D is connected by the pipe C as already explained with the series of inverted troughs in the bin or drier. The
30 blower and heater however are no parts of the invention and are shown only rudimentarily, as it is evident that any means for sending a heated volume or a cold blast of air through the drier, will accomplish the result.

The letter L represents a slide which extends through the entire length of the drier above the conveyer in the conveyer box B. It is provided with a handle and can be withdrawn when the grain has been sufficiently
40 dried, and it is desired to remove it by the operation of the conveyer, or by other means.

The mode of operation is quite apparent. When the bin or drier has been filled with grain, it will slide around the series of inverted
45 troughs, but leave the interior spaces of the troughs open and free in the nature of flues passing back and forth through the mass. The several troughs being alternately connected at opposite ends of the drier, the
50 air, heated or cold, is sent through a continuous conduit throughout the entire mass of grain. The pressure of the air not only forces it to escape and pass through the floor or mass of grain beneath the troughs, but where perforated troughs are used, it also escapes through
55 these perforations into the superincumbent mass; and thus the air is forced to come in contact with the whole mass uniformly and in all its parts, and this can be accomplished
60 by a very small volume of air at a low pressure and very economically.

It is evident that there may be many changes and modifications in the details of construction and in the arrangement of parts
65 of my invention, and I do not limit myself to the exact details, construction and arrangement shown.

Having described my invention, what I claim and desire to secure by Letters Patent of the United States is as follows:—

1. In a grain drier the combination of an inclosing shell or walls capable of retaining and holding a mass of grain; a series of inverted troughs located and supported therein, the spaces of said troughs being alternately
75 connected with each other at their ends so as to make them continuous; means for forcing a blast or current of air into said drier, said means being connected by a pipe with the space at one end of said continuous series of
80 troughs; all substantially as shown.

2. In a grain drier, the combination of an inclosing shell or walls capable of retaining and holding a mass of grain; a series of perforated inverted troughs located and supported therein, the spaces of said troughs being
85 alternately connected with each other at their ends so as to make them continuous; means for forcing a blast or current of air into said drier, said means being connected by a pipe with the space at one end of said continuous series of troughs; all substantially
90 as shown.

3. In a grain drier, the combination of a bin or receptacle having parts of two opposite
95 sides converging, and provided with a conveyer box and slide therefor; a series of inverted troughs located and supported in said bin or receptacle; pipes or conduits connecting the spaces of said troughs alternately
100 at opposite ends of said receptacle so as to make said spaces continuous; means for forcing a blast or current of air into said drier and through said continuous spaces, said means being connected by a pipe or tube
105 with the space of one of said troughs at the end of the continuous series; all substantially as shown.

4. In a grain drier the combination of a bin or receptacle provided on the interior
110 walls of its two opposite ends with blocks or brackets to support a series of inverted troughs; a series of inverted troughs located and supported in said receptacle, and their opposite ends resting and supported upon
115 said blocks or brackets; a series of pipes each end of which passes through openings in the end walls of said receptacle and through said blocks or brackets, connecting the spaces of said troughs alternately at each end so as to
120 make said spaces of said series of troughs continuous; and means connected by a pipe entering through the wall of said receptacle into the space of one of said troughs at the end of said series, for sending a blast of air
125 into said receptacle, and through the continuous spaces of said series of troughs; all substantially as shown.

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

WILLIAM MCKEE.

Witnesses:

BENTON J. HALL,
J. LAWRENCE GERRY.