

Grain Drier.

No. 37,869.

Patented March 10, 1863.

Fig: 1.

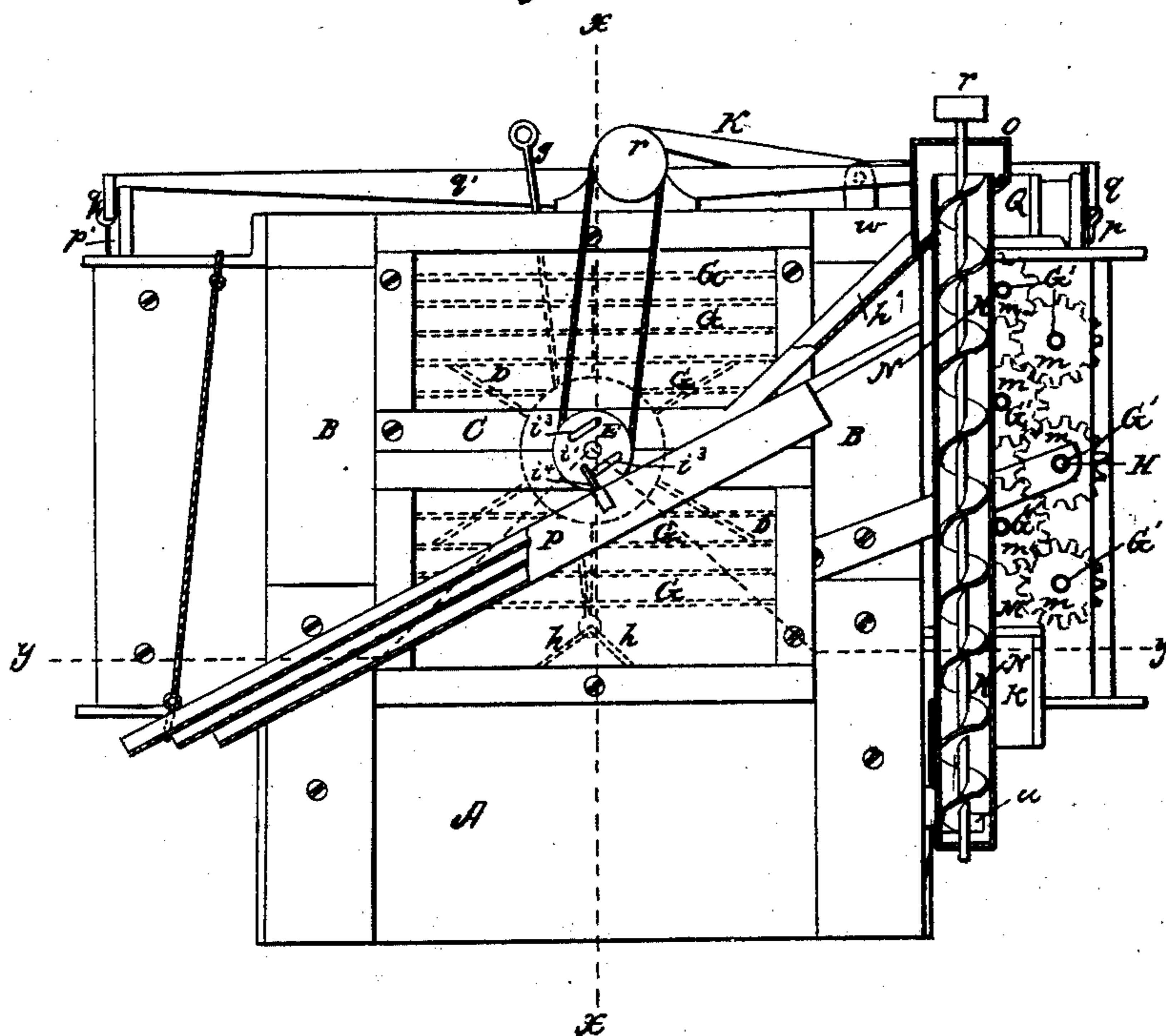
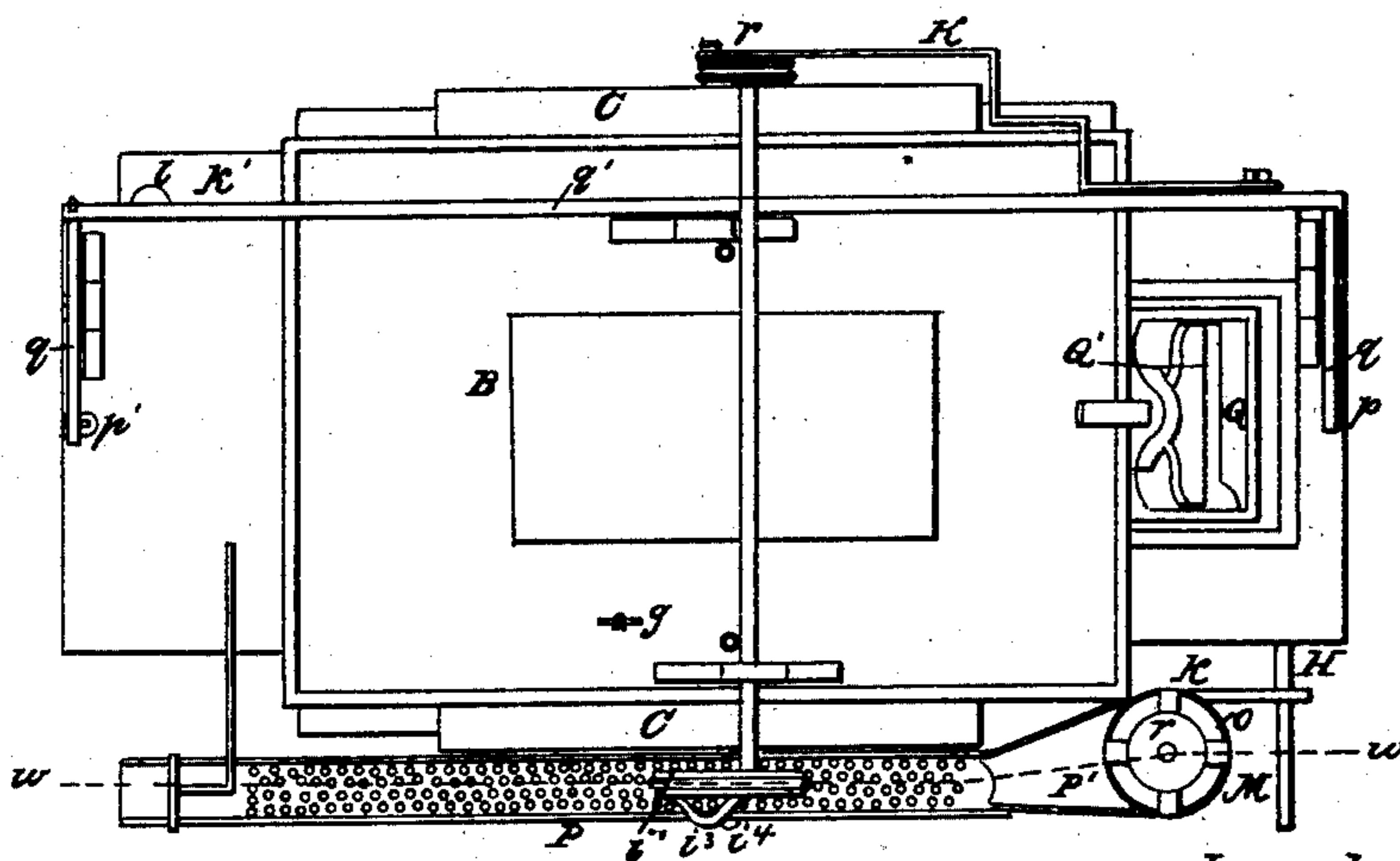


Fig: 2.



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Grain Drier.

3 Sheets—Sheet 2.

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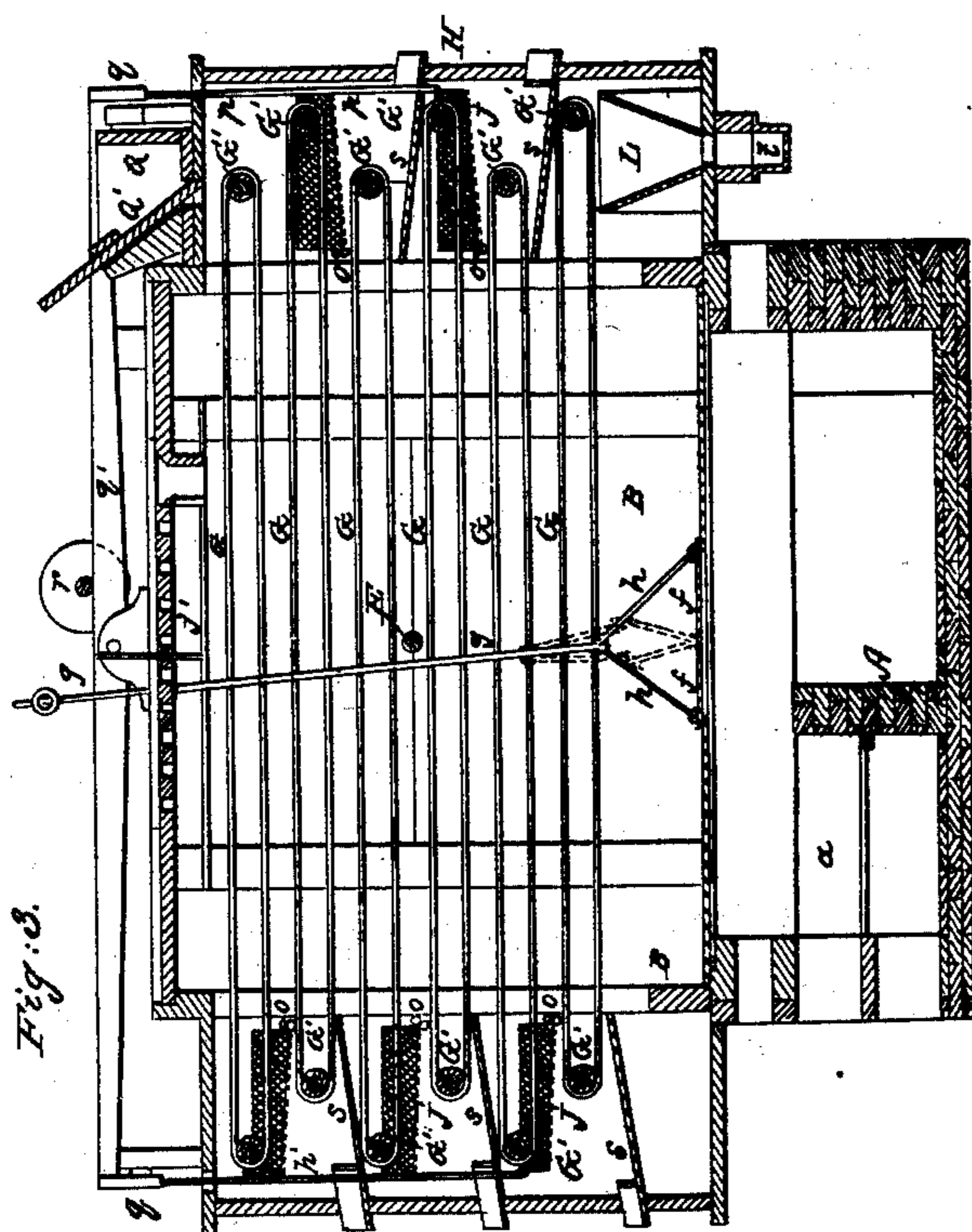


Fig. 8.

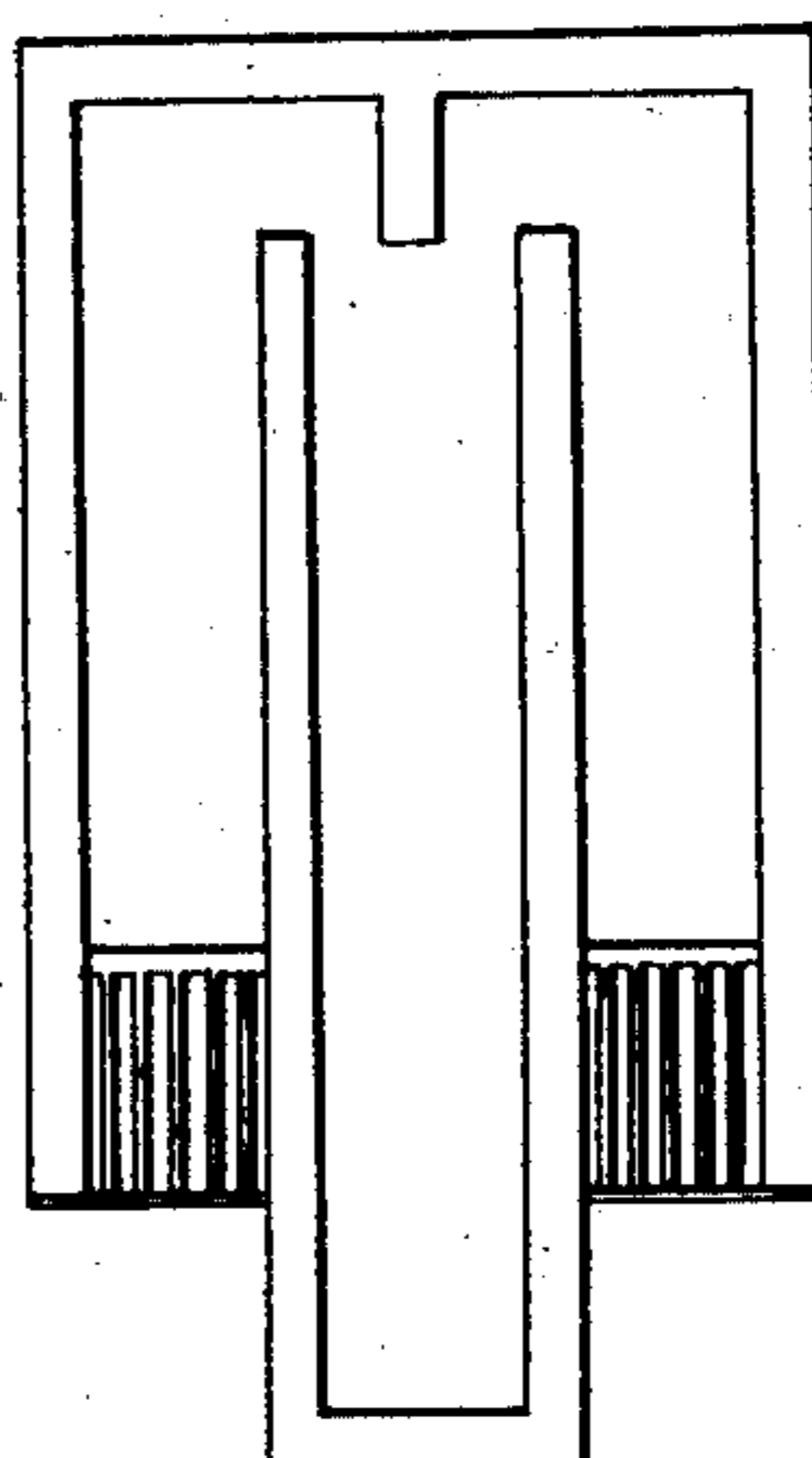


Fig. 7.

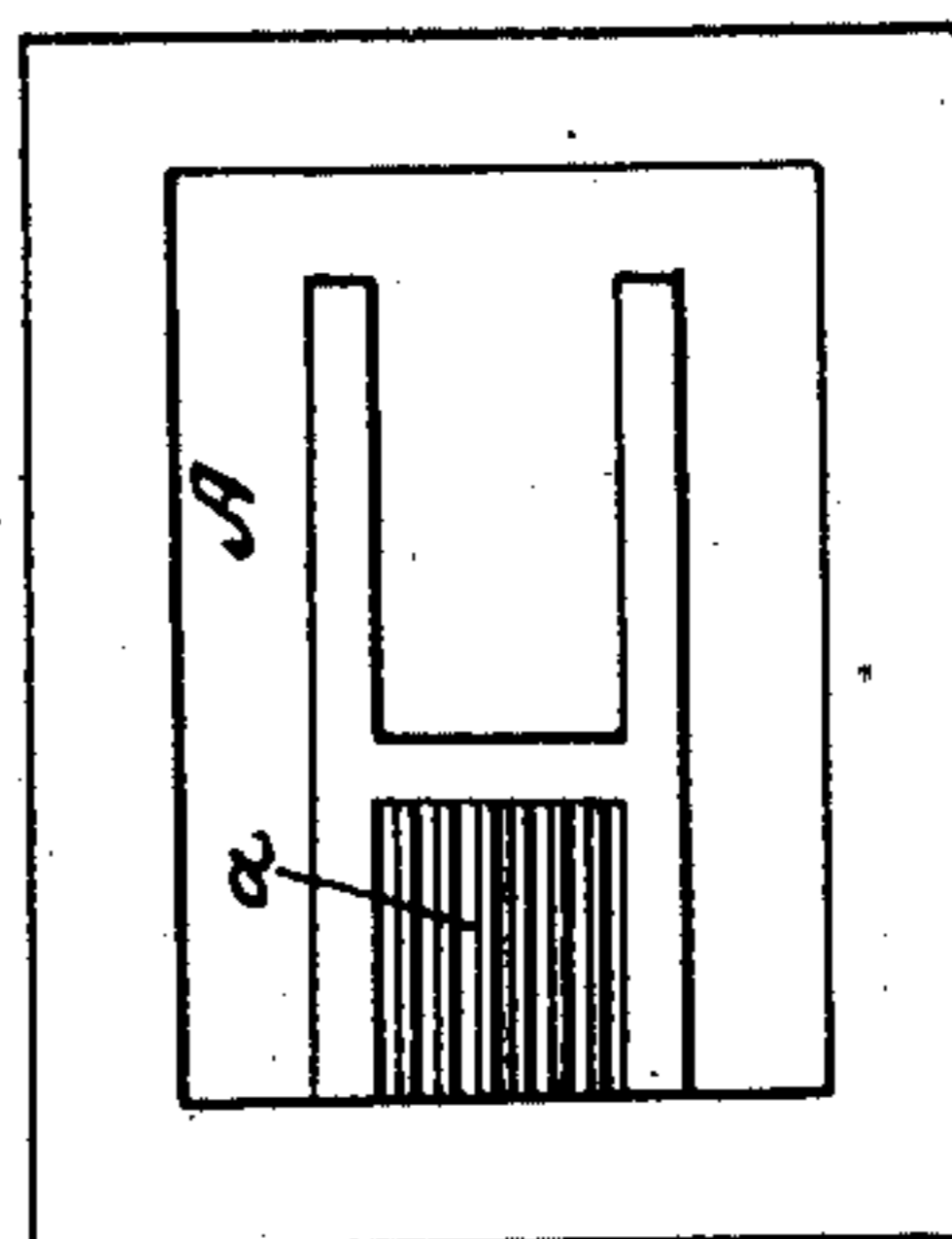


Fig. 6.

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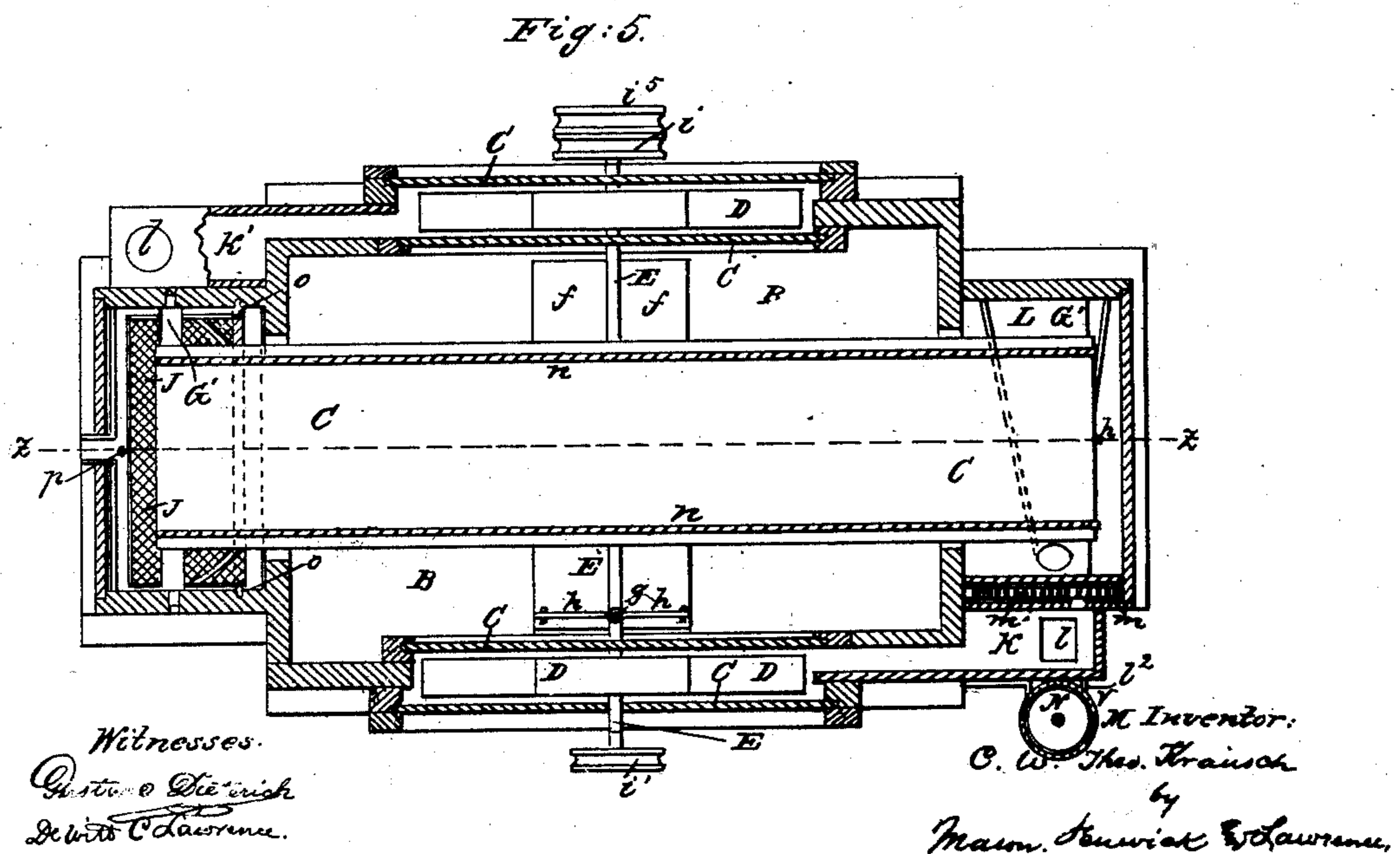
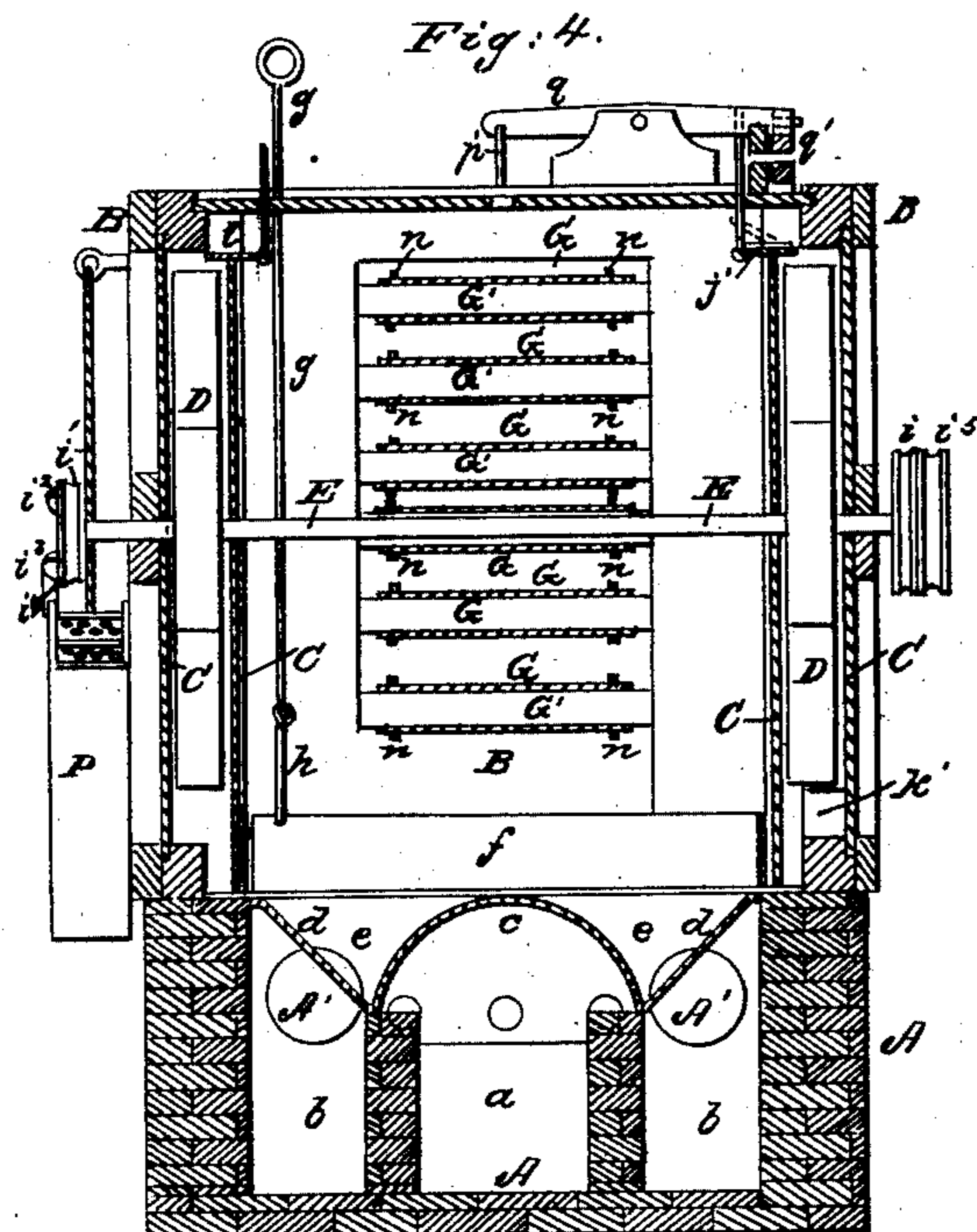
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Patented March 10, 1863.



UNITED STATES PATENT OFFICE.

C. W. THEODORE KRAUSCH, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN GRAIN-DRIERS.

Specification forming part of Letters Patent No. 37,869, dated March 10, 1863.

To all whom it may concern:

Be it known that I, C. W. THEODORE KRAUSCH, of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Machine for Drying Grain; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a partial section and side elevation of my machine in the line *ww* of Fig. 2. Fig. 2 is a plan view of the same. Fig. 3 is a vertical longitudinal section of the same in the line *zz* of Fig. 5. Fig. 4 is a vertical transverse section of same in the line *xx* of Fig. 1. Fig. 5 is a horizontal section of same in the line *yy* of Fig. 1. Figs. 6 and 7 are plan views of fire-furnaces.

The same letters of reference in the several figures indicate corresponding parts.

The nature of my invention consists, first, in the combination of vibrating sieve chutes with endless grain-carriers, and inclined dust-directors, the whole being arranged with respect to a hot-air drying-chamber.

It consists, second, in an arrangement of mechanism whereby a series of vibrating sieve-chutes, arranged at opposite ends of a series of endless grain-carriers of a drying-kiln, are vibrated simultaneously, and in such manner that the grain is agitated and screened of dust at both ends of the kiln, and transferred from one belt on to another.

It consists, third, in a fan arrangement for supplying the air-heating chambers of the furnace with air to be heated, causing a circulation of the hot air as fast as heated in the grain-drying chamber, and expelling the moistened hot air therefrom, as occasion may require.

It consists, fourth, in an arrangement of fire-furnace, hot-air reservoir, and valves, whereby the air is heated and its distribution into the carrier or drying chamber regulated.

It consists, fifth, in an arrangement whereby the cleaning, separating, and cooling of the dried grain are accomplished as fast as it leaves the carrier-chamber.

It consists, sixth, in an organization, substantially as hereinafter described, whereby the grain in its passage through the same is successively operated upon in the following

manner: First, it is carried back and forth through a hot-blast or suction current, and at intervals agitated and deprived of dust; second, carried up through a scourer, and there subjected to a cooling blast; and, third, to a separating action.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is a fire-furnace with a central flue, *a*, and two side flues, *b b*. The top of this furnace is of sheet metal, and shaped as shown at the letters *c d d* in Fig. 4, so as to give large flame room, and also form chambers *e e*, in which air may collect and be heated. *A' A'* are passages leading into chambers *e e*. In opposite ends of the furnace B is a drying or carrier chamber, with its sides, top, ends, and bottom made as nearly air-tight as practicable. The bottom of this chamber is of sheet metal, and serves to close in the air-heating chambers *e e*. Across the central portion of said chambers two hinged valves, *f f*, are arranged, a space corresponding in size with the valves being cut through the metal bottom of the drying or carrier chamber. From the valves a jointed forked rod, *g h h*, extends upward and out through the top of the drying-chamber. By this rod the two valves are opened or closed to a greater or less extent, as occasion may require. On each side of the drying-chamber an air-tight fan-case, C, is constructed, and in said cases C C narrow-bladed fans D D are arranged, they being supported by a transverse shaft, E, which extends across the drying-chamber, and has both its ends protruding beyond the outer sides of the drying-chamber, and furnished with belt-pulleys *i i' i''*. At the top of the fan-cases valves *j j'*, leading into the drying-chamber, are provided, and near the base thereof, at diagonal corners of the drying-chamber, air-chambers *k k'* are formed, said chambers constituting a part of the fan-case, and having each a passage, *l*, for the admission and discharge of the air used in treating the grain. One passage is located on the under side of the air-chamber *k*, and the other on the upper side of *k'*.

G G are a series of endless belts or grain-carriers arranged to travel longitudinally in the hot-air chamber. The rollers G' G' of these belts are arranged at the two ends of

the drying-chamber, a short distance above one another, and are geared together at one end of the kiln by cog-wheels *m m*, so as to be driven unitedly by one pulley-shaft, *H*, and alternately in converse directions, as represented. The belts are to be arranged with a suitable "tightener," so as to take up any slack that may occur in them during their use. They also are to be stiffened in any practical manner so as to obviate sagging. At the edges of the belts on the surface, where the grain is carried, ropes or other flexible ribs *n n* are formed so as to prevent the grain falling off while it is moved along upon the belts.

J J are inclined sieve-chutes arranged under one of the ends of each belt. These chutes are hung at one end on a pivot, *o*, and by their other ends they are suspended by vertical rods *p p'*, which extend up and attach to short rocking arms, *q q* of a long rocking or vibrating bar, *q'*, which bar is connected by a lever, *K*, to an eccentric-pin of a grooved pulley, *r*, as represented. This arrangement gives a vibrating motion to the sieve-chutes and enables the chutes to deposit the grain from one belt on to another, freed from a greater or less quantity of its dust. The dust escapes through the meshes of the shuttes, and to receive and conduct off this dust a series of conversely-inclined stationary aprons, *s s*, which terminate in a spout-form, are arranged below the sieve-chutes, as shown.

L is the chute or apron which receives the grain from the discharging end of the last or lowest apron and conducts it into a scouring mill or tube by means of an auxiliary apron, *t*, which leads directly into such tube.

M is the vertical scouring-tube, just mentioned. It is arranged on the outer corner of the drying-chamber, near where the air-chamber *k* is located, and its lower end has an opening, *u*, for admission of grain and air into it. In this spout a quick revolving screw-elevator, *N*, which acts as a scourer, is arranged as represented. On the top of the screw a pulley, *v*, is provided. The screw elevates the grain by reason of its speed being quicker than the effect of gravity upon it.

O is a hood or enlargement of the vertical tube *M*, with a discharge-passage, *W*, cut in its side. This hood affords room at the top of the tube and thus insures a proper discharge of the grain.

P is an inclined vibrating separator, constructed with three bottoms and three discharges. The two upper bottoms are perforated with holes of a size suited for the separation of the different kinds of grain. This separator is hung at its upper end by a pivot and at its lower end by a cord, chain, or spring so as to vibrate. The location of the separator is on the outside of the drying-chamber, and in such relation to the scourer as to receive the scoured grain therefrom as it runs down the inclined conductor *P'*, as shown. On the pulley *i'* of the fan-shaft two knockers, *i³ i³*, are provided. These, in connection with a pro-

jection, *i⁴*, of the separator, insure a vibration of the separator as the pulley *i* revolves.

Q is the hopper which supplies the grain to the belts. It has a cut-off slide, *Q'*, so that the supply may be regulated.

The furnace might have two main grate or fire chambers and one central flue, as seen in Fig. 7, and the air which passes through the grain-drying chamber might be taken off partly through the chimney of the furnace and partly below and through the fire, thus producing an artificial draft through the furnace, and also promoting combustion and heat, the moistened hot air from the drying-chamber supplying a larger quantity of oxygen than would be the case if cold and comparatively dry air from outdoors was used. Such a plan or arrangement I have in use, and it works well. Again, a series of vertical tiers of horizontal belts with auxiliaries such as described might be arranged in one drying-chamber, and thus several different kinds of grain dried at the same time.

The operation of the machine as described and represented is as follows: Fire being built in the furnaces, the valves *f f* and *l l* opened and the belts, sieve-chutes, fans, scourer, and separator set in motion, wet grain is fed into the hopper *Q* and therefrom it falls upon the first belt and is carried by the same to the other end of the drying-chamber and deposited into the first vibrating sieve-chute *J*, where it is agitated and separated from dust. Out of the chute *J* it passes on to the second belt and is carried back and deposited into another chute, *J*, where it is again agitated and freed from dust, the dust passing off on the chute-aprons *S* while the grain falls into the third belt. Thus the action on the grain continues until it arrives at the discharging end of the last belt. As the grain passes through the drying-chamber, it is subjected to a blast or circulating current of hot air created by the suction of the fans, the air being first drawn from outdoors into the heating-chambers through the passages *A' A'* of the furnace, where it is heated and from whence it is caused to circulate by the action of the fans in the drying-chamber *B* and among the grain on the belts, its escape into said chamber being permitted by the valves *f f*. The hot air, having expended its action upon the grain, is drawn out of the drying-chamber into the fan-cases, and from thence forced into the air-chambers *k k'*, and from one of said chambers it may be led into the furnace-flue and down through the fire-grate. Now, as the grain passes from the last belt into the scouring-tube *M*, by means of the chutes *L t*, a blast of cool air may, by closing the valves *j* and providing a cold-air inlet, be forced by one of the fans through it and into the tube from the air-chamber *k*. By this means the grain, as it is elevated and scoured in the tube by the screw, is cooled. From the tube the grain falls into the separator by means of the chute *P'*, and is there agitated and separated,

the corn passing down and discharging at the end of the first bottom of the separator, while oats and wheat escape through the meshes of said bottom and fall upon the second bottom, and here the wheat discharges at the end of said bottom, while the oats pass through perforations and fall upon the third bottom, from the lower end of which they discharge. As grain passes through the separator, it is to be subjected to a blast of air supplied from one of the fans, D, in any appropriate manner.

It is obvious that if the valves *j j'*, with the valves *f f*, are opened, the fans will suck in air at *A' A'* and force it out at *l l*, when turned in one direction; but if the motion of the fans is reversed, under the same condition of things the air will be sucked in at *l l* and forced out at *A' A'*. By closing the valves *j j'*, the air can be retained any length of time, and by closing valves *f f* and opening *j j'* the admission of hot air can be stopped while its expulsion is being effected. Again, by closing one of the valves *j* or *j'*, one of the fans can be prevented from operating upon the hot air in the drying-chamber, and, finally, by adjusting the valves *j j'* and *f f* to a greater or less extent the quantity of air passing into and out of the chamber can be regulated or controlled.

My arrangement as a whole might be used for cleaning grain without subjecting it to the drying process. In that case the fire in the furnace would not be started except at such times as occasion required. In case a grain drier should be built with the fans so arranged that they may suck or force, or at the same time both suck and force, by simply changing the belts, it then becomes necessary to have the fans on separate shafts with double wind-passages and valves to open and close the same, according to the direction the fans are moved.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of an agitating, cleaning, and conducting device or devices with the carrier belt or belts of a grain-drier, substantially as and for the purpose set forth.

2. The arrangement of mechanism for vibrating a series of agitating and cleaning sieve-chutes, arranged at opposite ends of a series of endless grain-carriers or belts of a grain-drier, substantially as described.

3. Producing a circulation of air through the chamber of a grain-drier and expelling the same therefrom, for the purposes set forth, by means of one or more fans, applied with respect to the endless grain-carriers, the air-heating chambers, and the drying-chamber, and operating substantially as described.

4. The arrangement of the fire-furnace, hot-air chambers *ee*, adjustable valve or valves *f f*, and drying-chamber B, or their equivalents, substantially as and for the purposes set forth.

5. The valves *j j*, in combination with the fan-cases and the drying-chamber and its valves *f f*, substantially as and for the purposes set forth.

6. The air-chambers *k k' l l*, in combination with the fan-cases and the drying-chamber, substantially as described.

7. The combination of the scourer with the drying apparatus, substantially as described.

8. The combination of the separator with the grain-drier, substantially as described.

9. An organization, substantially as described, whereby the grain is dried, agitated, dusted, scoured, separated, and cooled, as set forth.

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Witnesses:

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