

J. RUSSELL.  
Grain Cleaning Machine.

No. 232,303.

Patented Sept. 14, 1880.

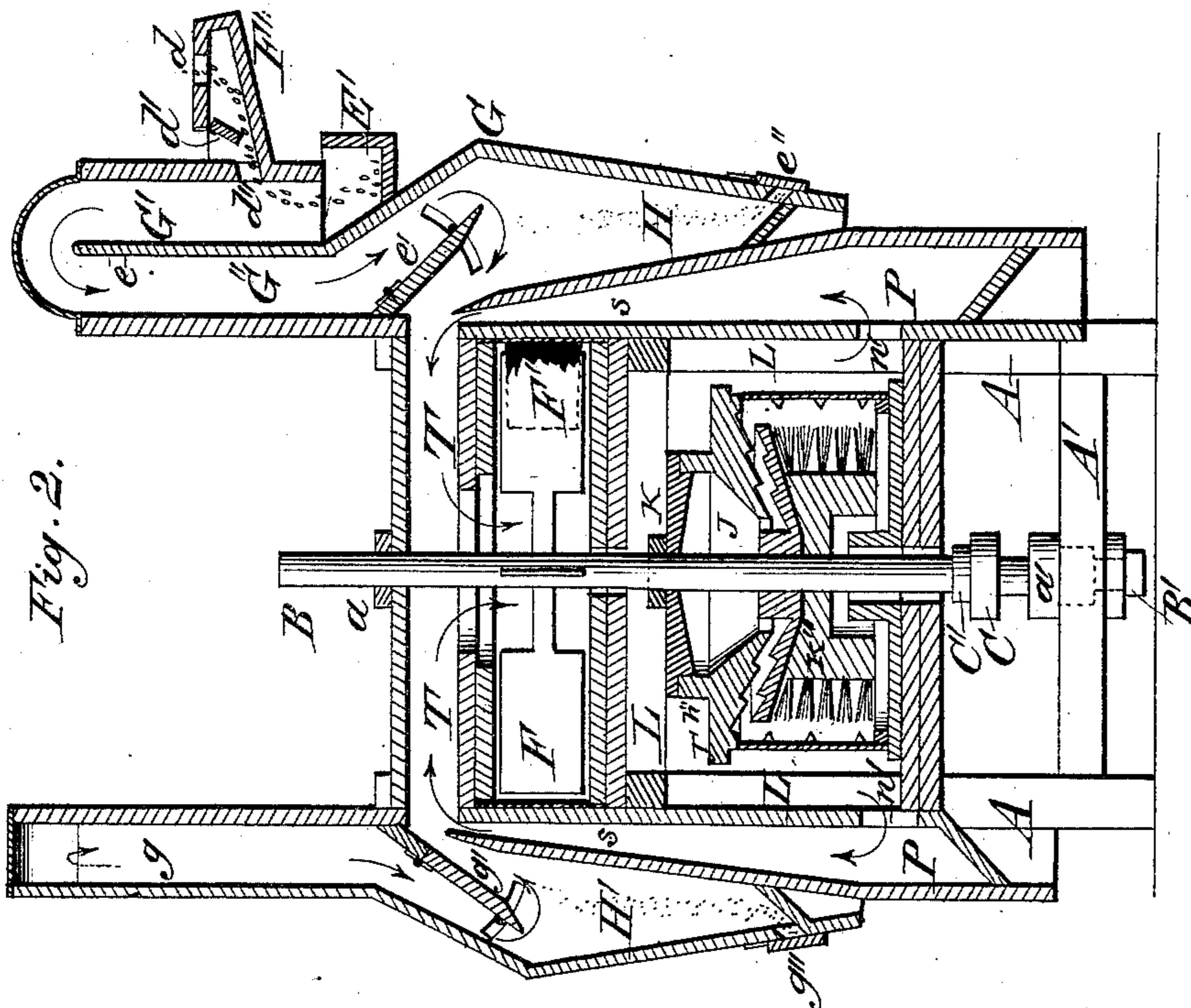


Fig. 2.

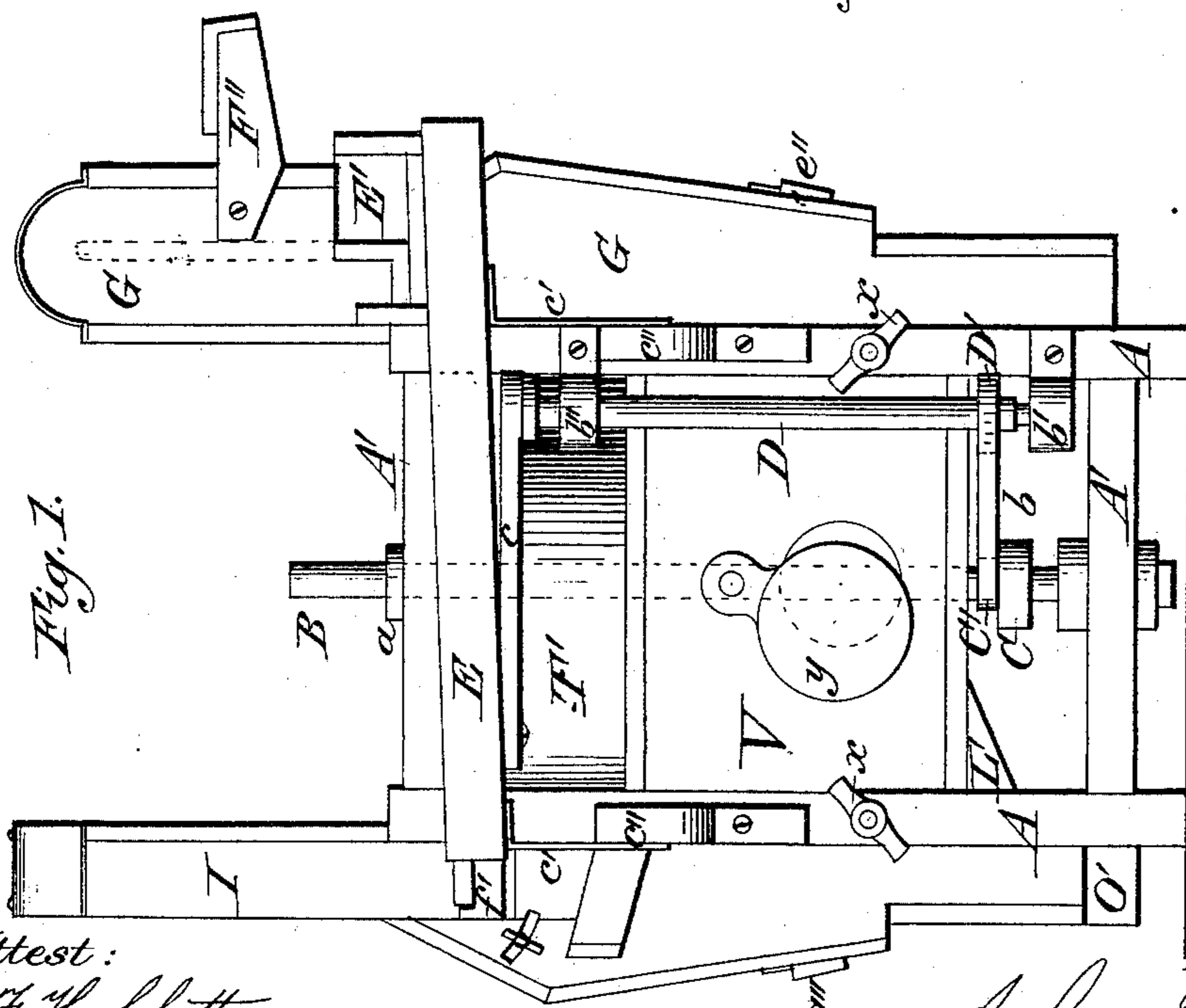


Fig. 1.

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Fig. 4.

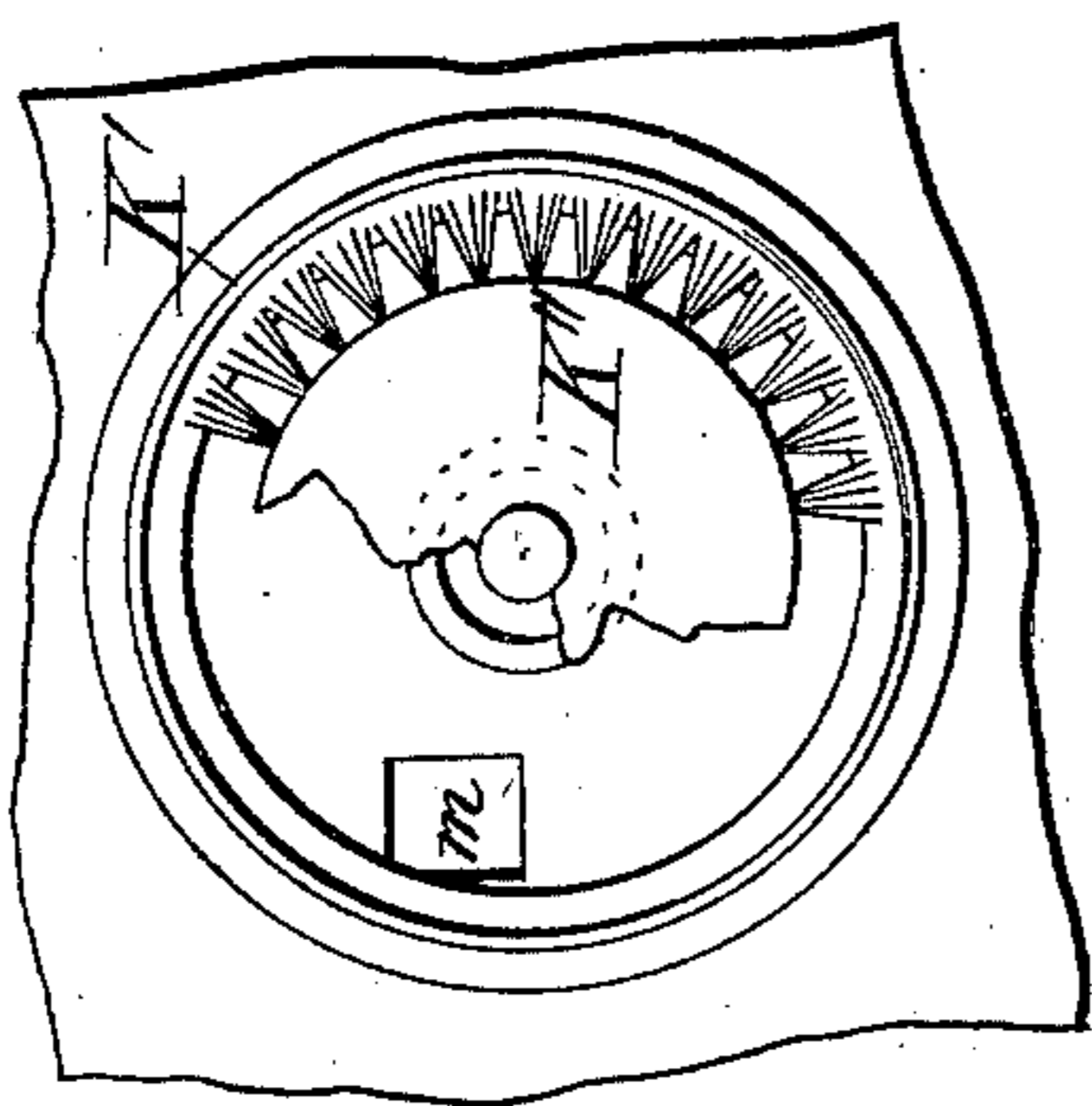


Fig. 5.

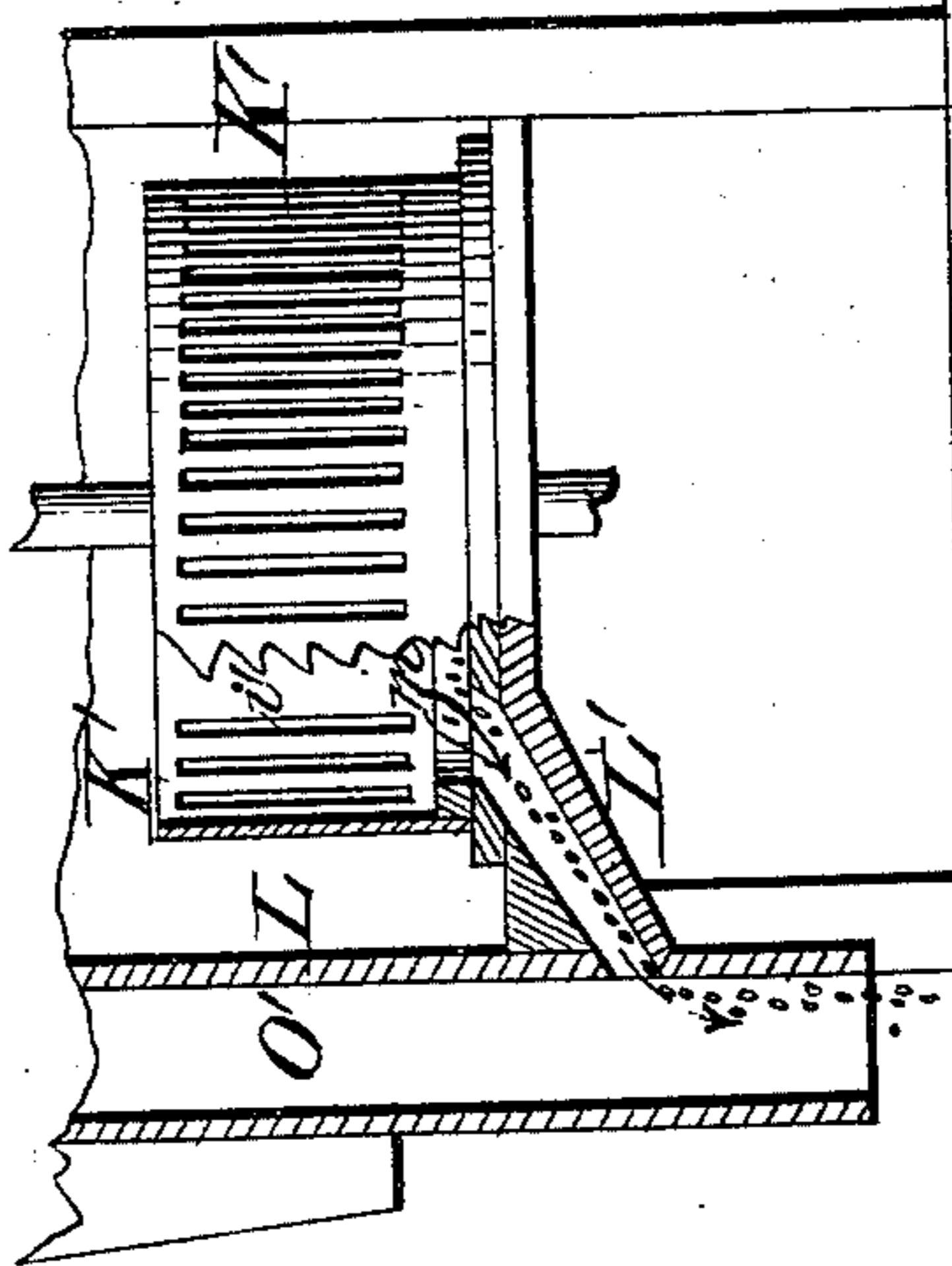
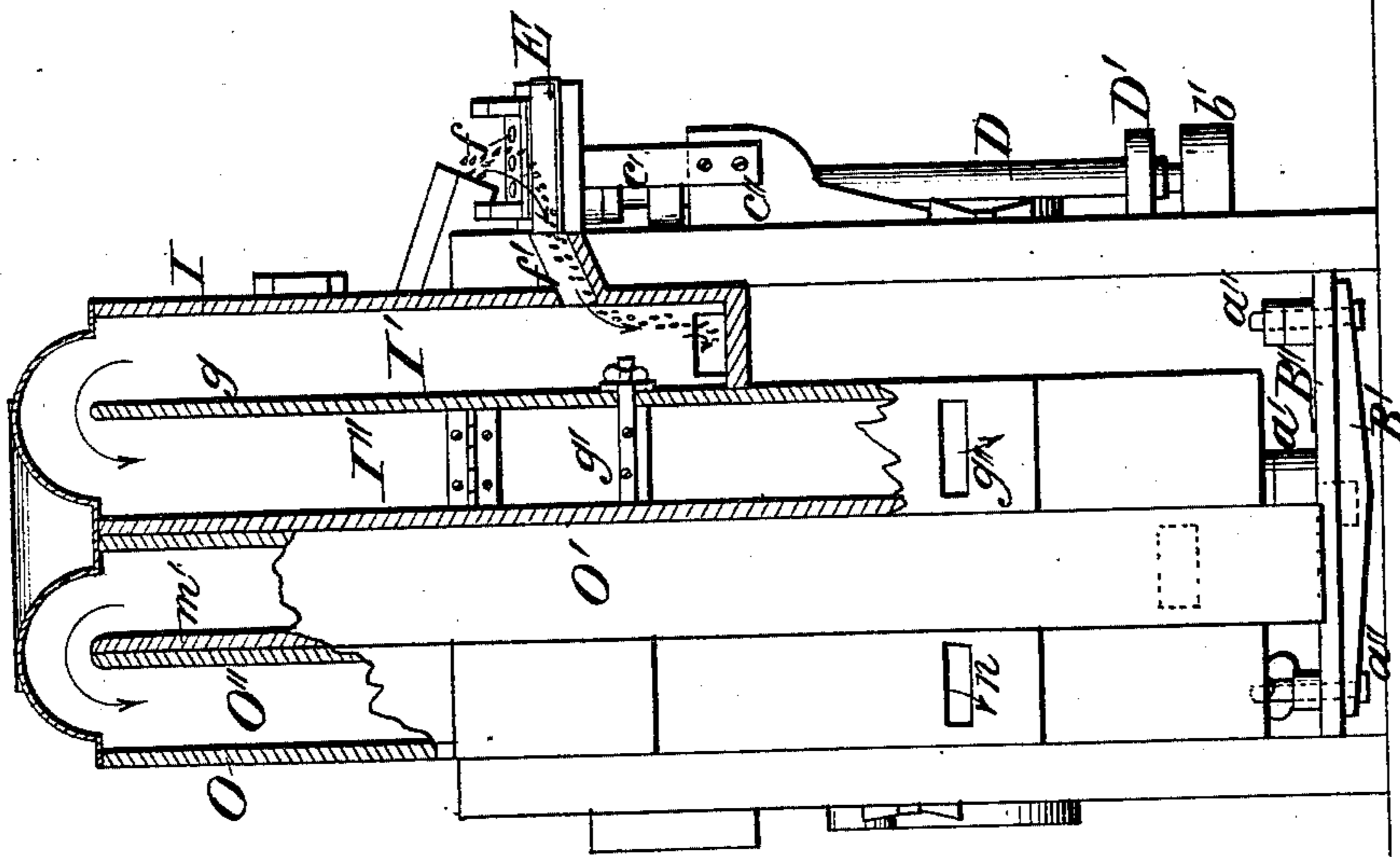


Fig. 3.



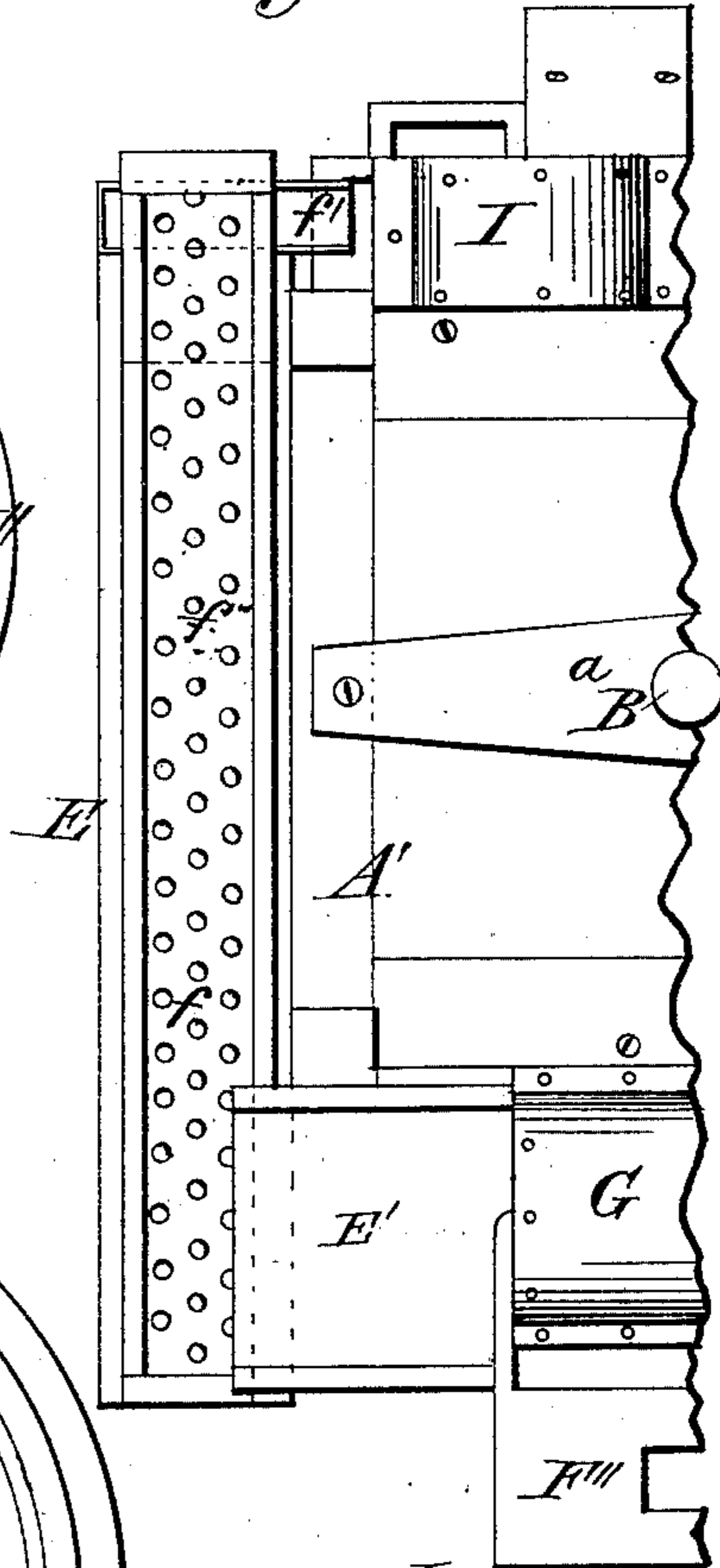
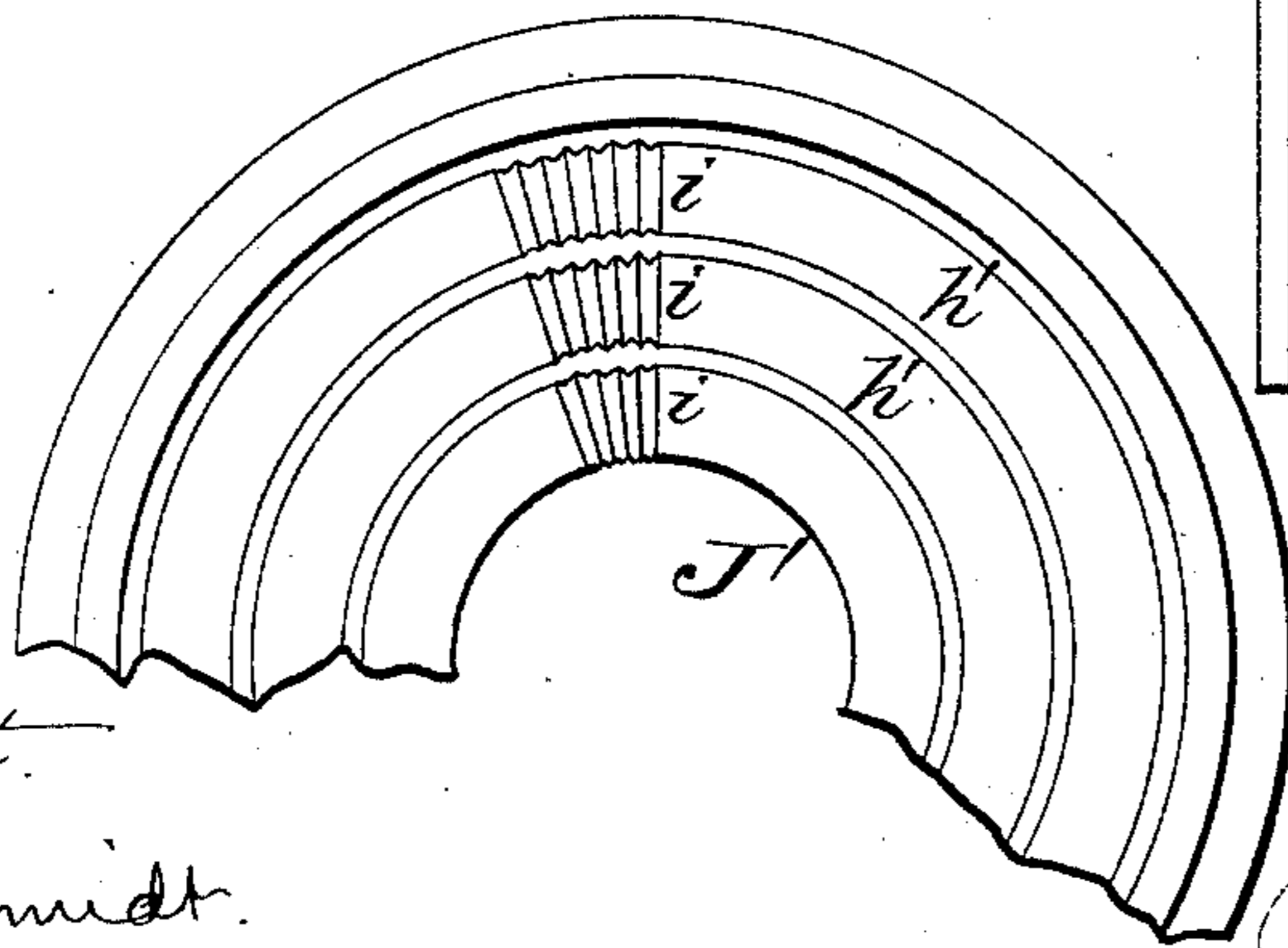
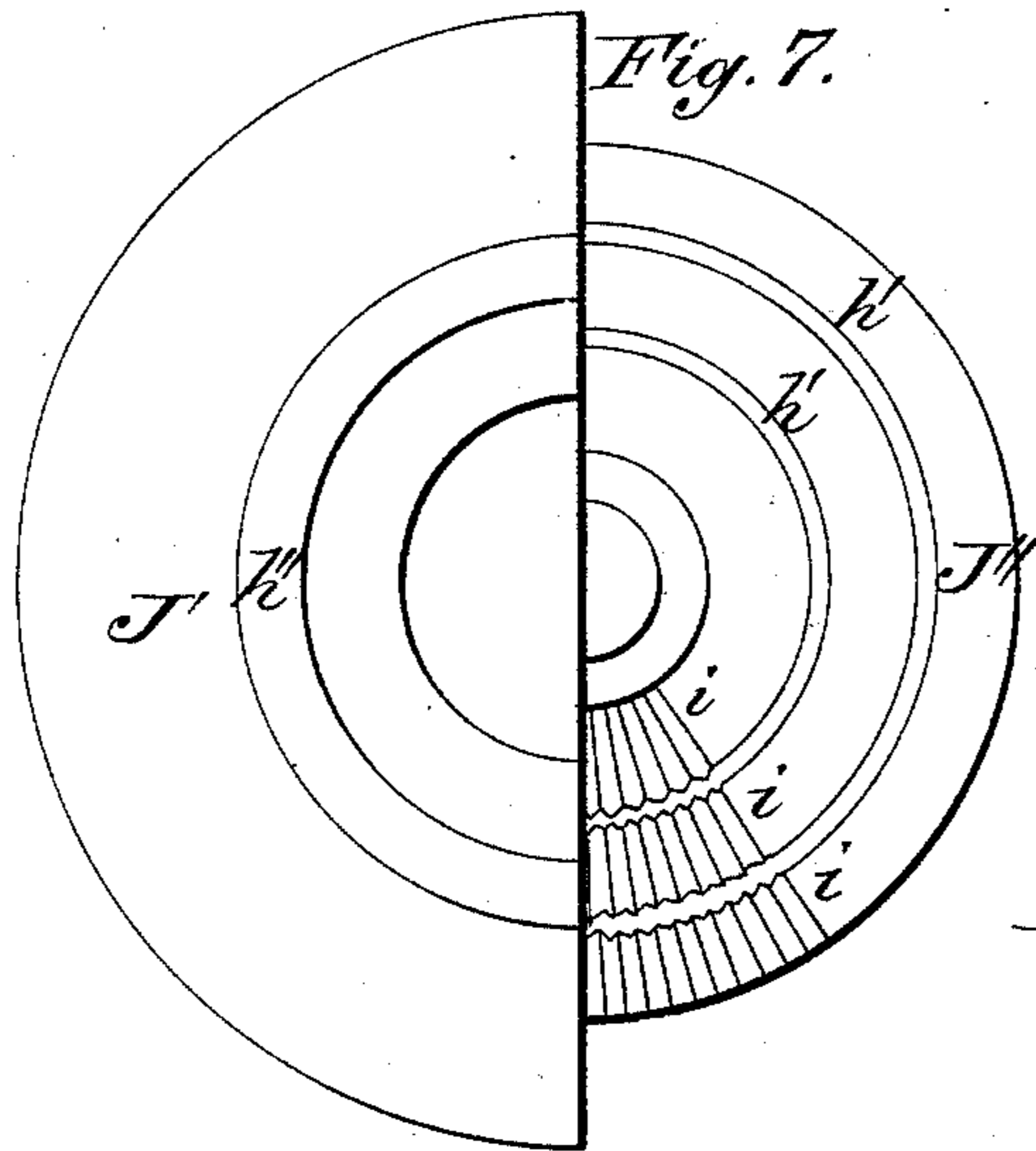
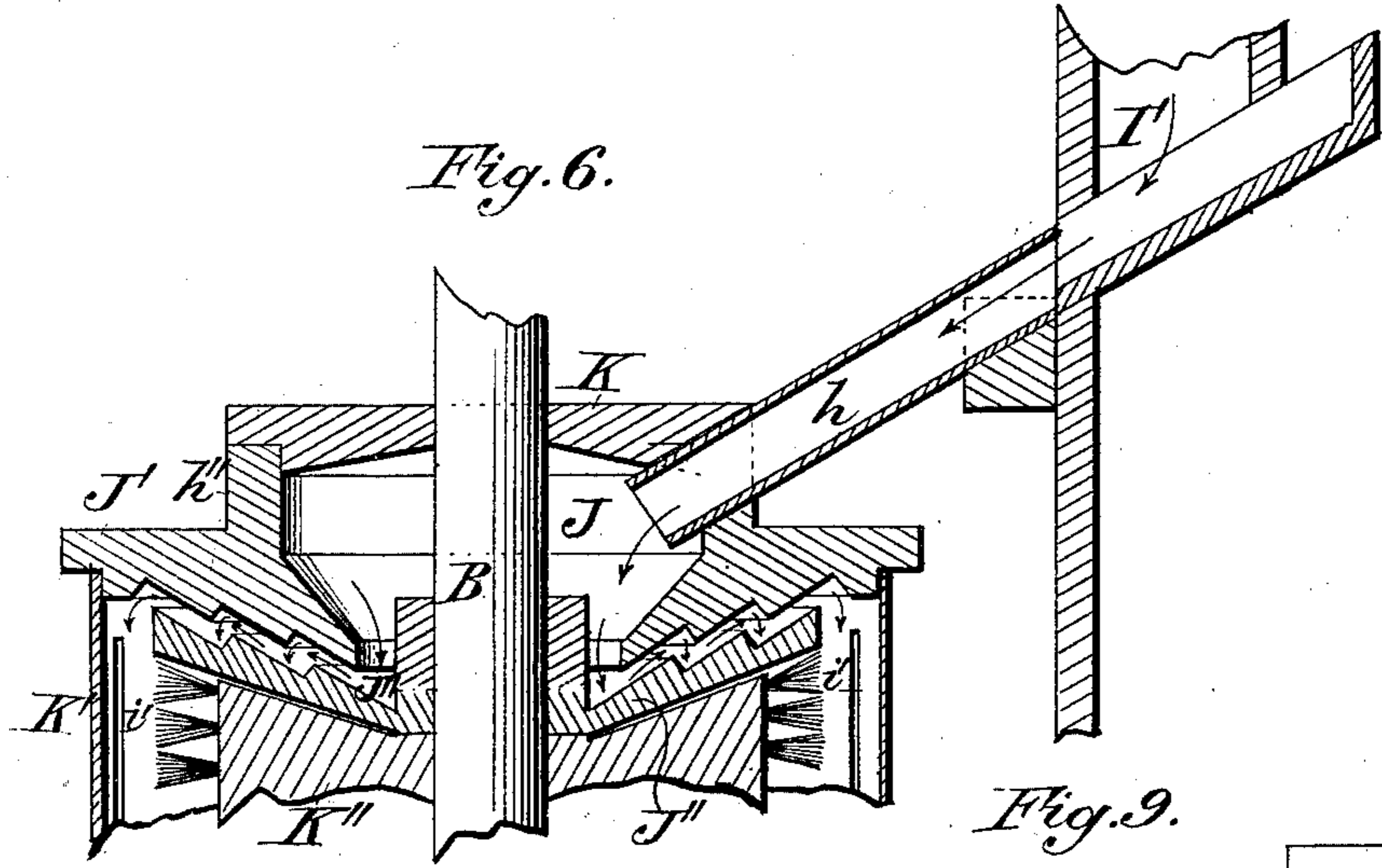
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# UNITED STATES PATENT OFFICE.

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## GRAIN-CLEANING MACHINE.

SPECIFICATION forming part of Letters Patent No. 232,303, dated September 14, 1880.

Application filed December 1, 1879.

*To all whom it may concern:*

Be it known that I, JOHN RUSSELL, of Berlin, in the county of Somerset and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Cleaning Grain; 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, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of machines generally used in connection with flouring-mills for the purpose of cleaning the grain from dust and impurities before grinding, the object being to produce a machine that shall more perfectly scour and carry off the impurities of the grain than has hitherto been possible with the apparatus usually employed for that purpose.

My invention consists in certain improvements in grain-cleaning machines, hereinafter more fully set forth.

Figure 1 of the drawings is a side elevation of the machine. Fig. 2 is a vertical section, showing the relative positions of the scourer, exhaust-fan, and dust-spouts. Fig. 3 is an end elevation, partly in section, showing the relative positions of the screen and spouts through which the grain enters the machine. Fig. 4 is a plan of the scouring-brush, a part being removed to show the opening through which the grain passes from the brush-case. Fig. 5 is a side view, partly in section, showing the construction of the brush-case, together with the spouts through which the grain is discharged into the store-bin. Fig. 6 is a vertical section through the rubbers and spout by which grain is conveyed to them. Fig. 7 is a plan view of one-half of each rubber, and showing the steps and corrugations of the lower one. Fig. 8 is a plan of the under side of the upper or stationary rubber; and Fig. 9 presents a plan of one-half the machine, showing the relative positions of the shaking-screen to the other parts of the apparatus.

I construct my machine as follows: A frame formed by connecting the posts A by means

of suitable cross-girts A' supports the various parts of the machine, principal among which is the vertical shaft B, the upper end revolving in the bearing *a*, while the lower end rests in the vertically-adjustable step *a'*, which is, in turn, supported upon the movable bridge-tree B', made vertically adjustable by means of the bolts *a''*, which pass through the ends of the bridge-tree and upward through the girt B'', which is supported by the lower pair of girts, A'. Motion is communicated to this shaft B by a belt from any suitable prime mover to the pulley C, and from the pulley C', placed upon the shaft B just above its driving-pulley, to the shaker-shaft D by the belt *b*, running upon the pulley D', attached to said shaker-shaft, which is stepped in the bracket *b'*, attached to one of the corner-posts A, and is retained in position near its upper end by the bracket *b''*, also attached to the corner-post. The upper end of the shaker-shaft D is provided with a crank or eccentric, which, through the agency of the pitman *c*, operates the shaking screen E. This screen is supported in a slightly-inclined position upon the springs *c'*, the lower ends of which are secured to brackets *c''*, attached to two of the corner-posts A.

The grain to be cleaned enters the machine through the opening *d* in the hopper F'', attached to the side spout, G. A valve, *d'*, is placed at the outlet of this hopper, which spreads out the grain and causes it to enter the division G' of the spout G through the elongated slot *d''* in a thin sheet, falling down through the open mouth of this division of the spout into the trough E'. During this passage it is subjected to the action of a current of air, which enters the division G' of the spout through its open mouth, and carries with it the dust and light seeds that may be among the grain over the top of the partition *e*, into the division G'' of the spout, thence down, as shown by the course of the arrows in Fig. 2, until it has passed the valve *e'*, when the seeds and heavier particles fall into the receptacle H, and are withdrawn through the valve *e''*. The dust and lighter particles are carried on, as shown by the arrows, through the chamber T and into the exhaust-fan F, and thrown out of the machine through the opening or spout F'.

It will be observed that the valve  $e'$  is made adjustable, so as to control the strength of the current of air which passes through the spouts, and enables the operator to regulate it exactly to suit the grain being cleaned. The grain is carried on by the trough  $E'$ , and falls into the upper end of the shaking screen  $E$ , which is provided with a perforated metallic plate,  $f$ , placed a short distance above its real bottom. Through this plate the grain falls, while the straw or other extraneous matters, too heavy to be carried off by the air-current to which the grain has been exposed, and too large to pass through the openings in the plate, are separated, passing freely off at the lower end of the plate  $f$ , while the grain which falls through the plate is delivered into the trough  $f'$ , from which it passes into the division  $I'$  of the spout  $I$ , Fig. 3. It is here met by another ascending current of air, which takes up any dust or light particles that may have been loosened by the shaking of the screen, and carries them over the partition  $g$  into the spout  $I''$ , in which another separation takes place, the lighter parts going under the valve  $g'$ , through the passage above and into the exhaust-fan  $F$ , through the central opening in its top surrounding the shaft  $B$ , the heavier portions falling into the receptacle  $H'$ , from which they are removed through the opening at  $g''$ .

The grain, when it falls to the bottom of the division  $I'$  of the spout  $I$ , enters the trough  $h$ , through which it passes to the hopper  $J$ , formed in the concavity of the upper stationary rubber,  $J'$ , and thence passing through a central opening surrounding the shaft  $B$ , falls upon the revolving rubber  $J''$ , which is keyed or otherwise secured to the shaft  $B$  and rotates with it.

The upper concave surface of the lower rubber and under convex surface of the upper one are formed with concentric steps  $h'$ , the spaces between which are reeded or fluted, as shown at  $i$  in Figs. 7 and 8.

A vertical flange,  $h''$ , is formed on top of the stationary rubber surrounding the hopper  $J$ , and supports the cover  $K$ , thus inclosing the hopper and causing air to be drawn with the grain through the trough  $h$ .

The form of the rubbers causes the grain to be retained for a considerable time between them before it can escape over the outer edge of the lower one, thus causing it to be thoroughly scoured by its frictional contact with the reeded surfaces of the rubbers and the rubbing of the grains against each other.

Beneath the rubbers is placed the cylindrical sheet-metal case  $K'$ , perforated by the longitudinal slits  $i'$ . Within this case, and secured to the shaft  $B$ , is the brush-wheel  $K''$ , the brushes of which strike and clean the grain as it drops down from the rubbers between the brush-wheel and case. The rapid rotation of the brush also forces a current of air and dust through the slits in the casing  $K'$

into the space or chamber  $L$ , surrounding it. The grain falling to the bottom of cylinder-case  $K'$  passes out through the opening  $m$  in its bottom into the pipe  $L'$ , from which it falls into the lower end,  $O'$ , of suction-spout  $O$ , and passes down into the stack-bin or other receptacle; but in its passage it is again intercepted by an upward current of air, which carries up through the spout  $O'$  and over the partition  $m'$  into the spout  $O''$  any particles of dust or dirt which were not blown out through the slits of the case  $K'$ . This debris is again separated, the heavier portions passing down into a receptacle and out through the opening  $n$ , while the lighter parts pass into the chamber  $T$ , over the top of the fan-case, through the opening in its top, and, with the debris from the other spouts, out through the opening or spout  $F'$ . That portion of the dust and dirt which passes through the slits in the case  $K'$  into the chamber  $L$  is drawn out through the openings  $n'$  into the chambers  $P$ , from which the lighter portions are carried through the narrow openings  $s$  into the chamber  $T$ , and from thence into the fan, while the heavier parts may be withdrawn, as they accumulate, through the openings  $s'$  near the bottom of the chambers  $P$ .

The fan  $F$  and fan-case  $T'$  are constructed in any of the well-known forms now in use, the wings of the fan being attached directly to the shaft  $B$  and rotated by it.

The sides of the chamber  $L$  may be closed by removable doors  $V$ , held in place by the buttons  $x$  or other suitable devices. These doors render the chamber as well as the rotating portions readily accessible for inspection and repairs; and to allow a more ready inspection of the interior than could be obtained by removing the whole door, a swinging wicket,  $y$ , may be supplied to one or both of them, as desired.

It will be seen that this whole apparatus acts upon the principle of withdrawing the dust and other debris lighter than the grain being cleaned by attenuated currents—that is, air of less density than the surrounding atmosphere—and depends especially for a nearly-perfect result upon the repeated exposure of the grain to these currents.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent, the following:

1. The combination, with the spout  $G$ , provided with the partition  $e$ , valve  $e''$ , adjustable valve  $e'$ , and hopper  $F''$ , with valve  $d'$ , of the shaking screen  $E$ , spout  $I$ , provided with the conveyer  $f'$ , partition  $g$ , valve  $g''$ , adjustable valve  $g'$ , exhaust-fan  $F$ , and chamber  $T$ , having a central opening and discharge-spout, whereby the grain is subjected, before reaching the smutter, to the cleaning operation of two separate suction-currents of air from a single exhaust-fan, substantially as described.

2. The upper stationary convex rubber,  $J'$ , having its face cut in steps and provided with

a vertical flange,  $h''$ , and cover K, forming a hopper J, in combination with the concave revolving rubber  $J''$ , having its upper face cut in steps, substantially as described.

- 5 3. The combination, with the rubbers  $J' J''$ , constructed as described, and having the hopper J, of the fan F, brush-cylinder  $K''$ , perforated casing  $K'$ , chamber L, and chamber P, having an opening, s, leading into the central

opening in the chamber T, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 17th day of November, 1879.

JOHN RUSSELL.

Witnesses:

E. A. DICK,

F. H. SCHOTT.