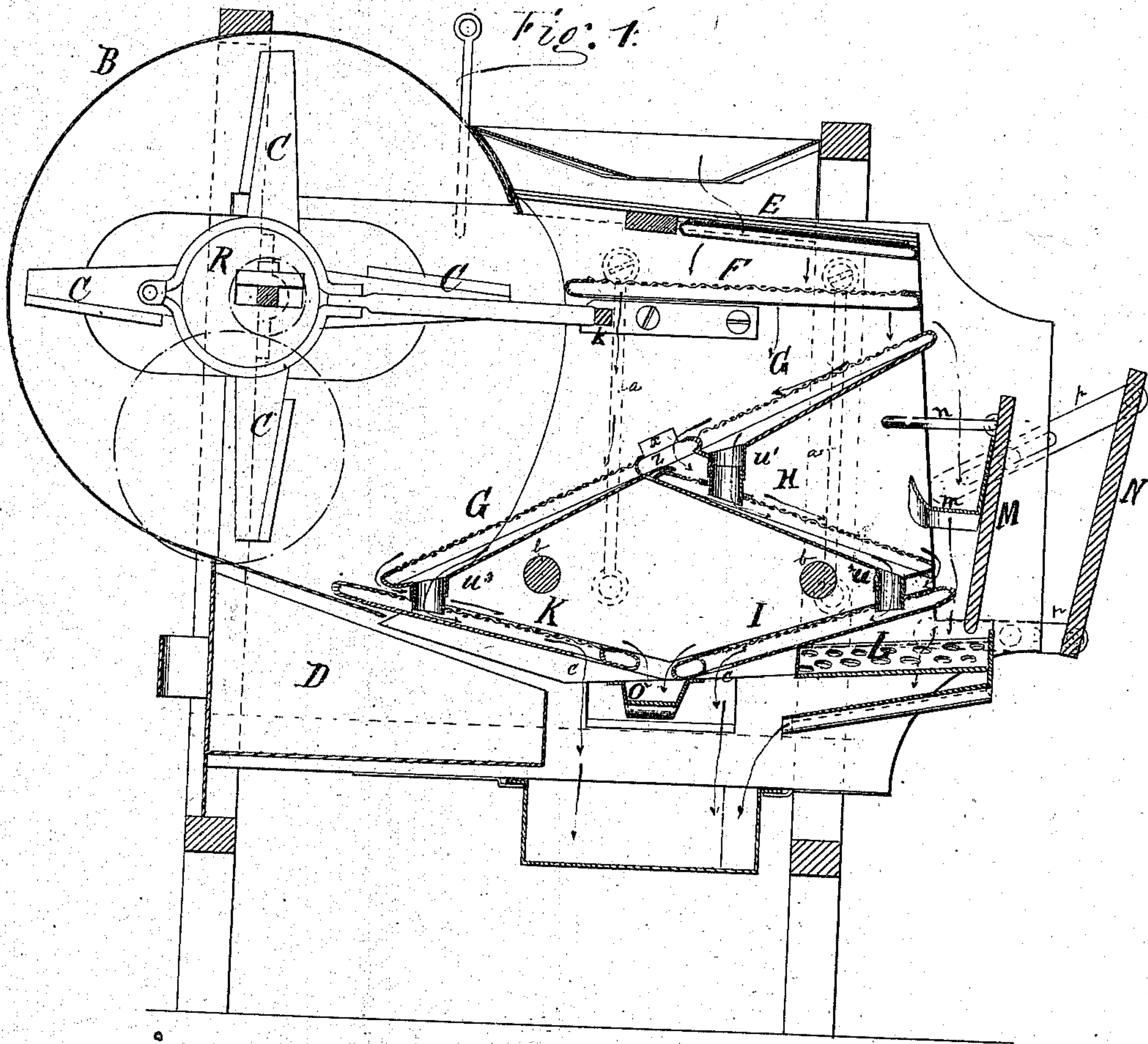


Dr. James I. Smith and Wm. H. Nicodemus.

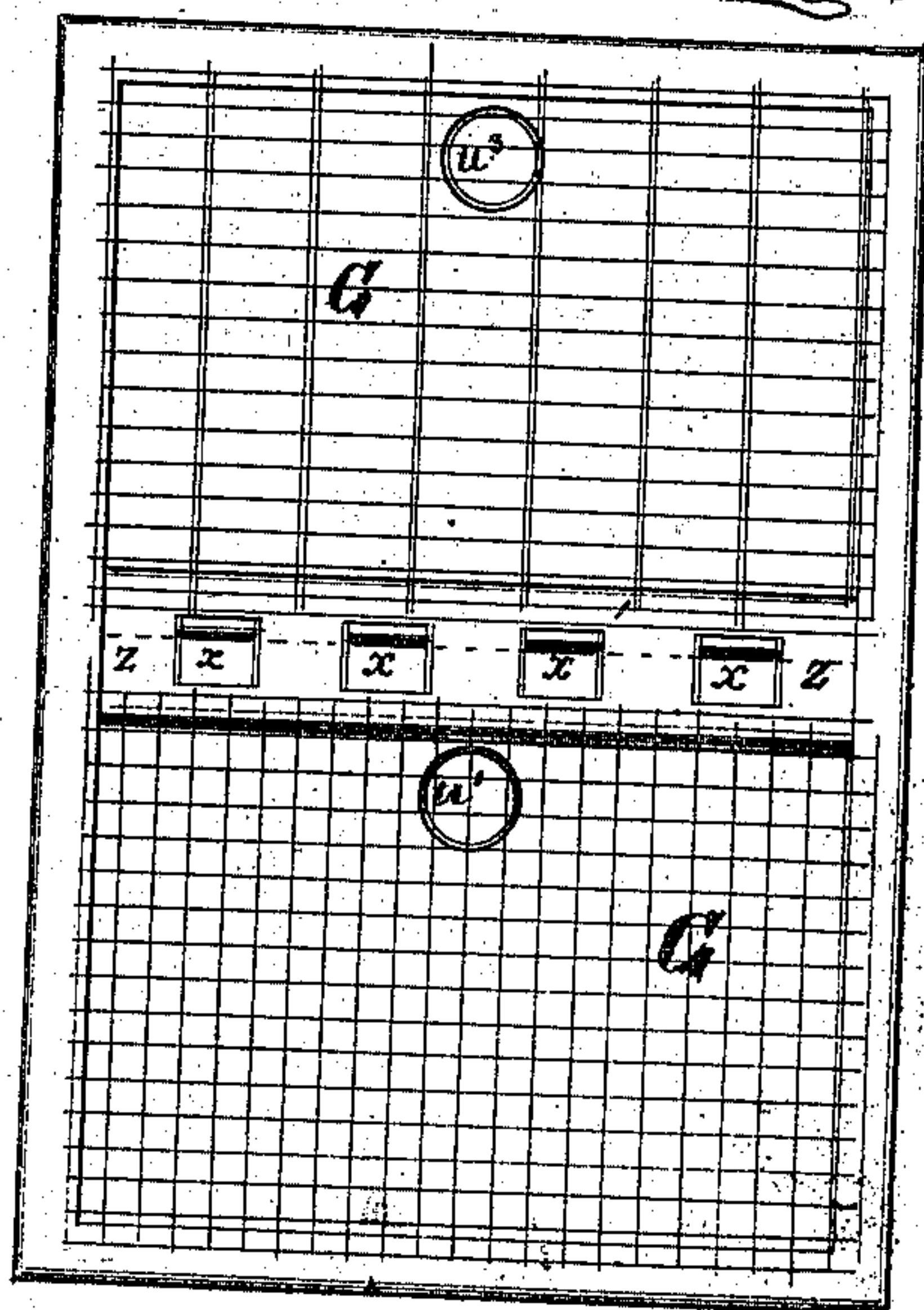
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Fan and Separator.

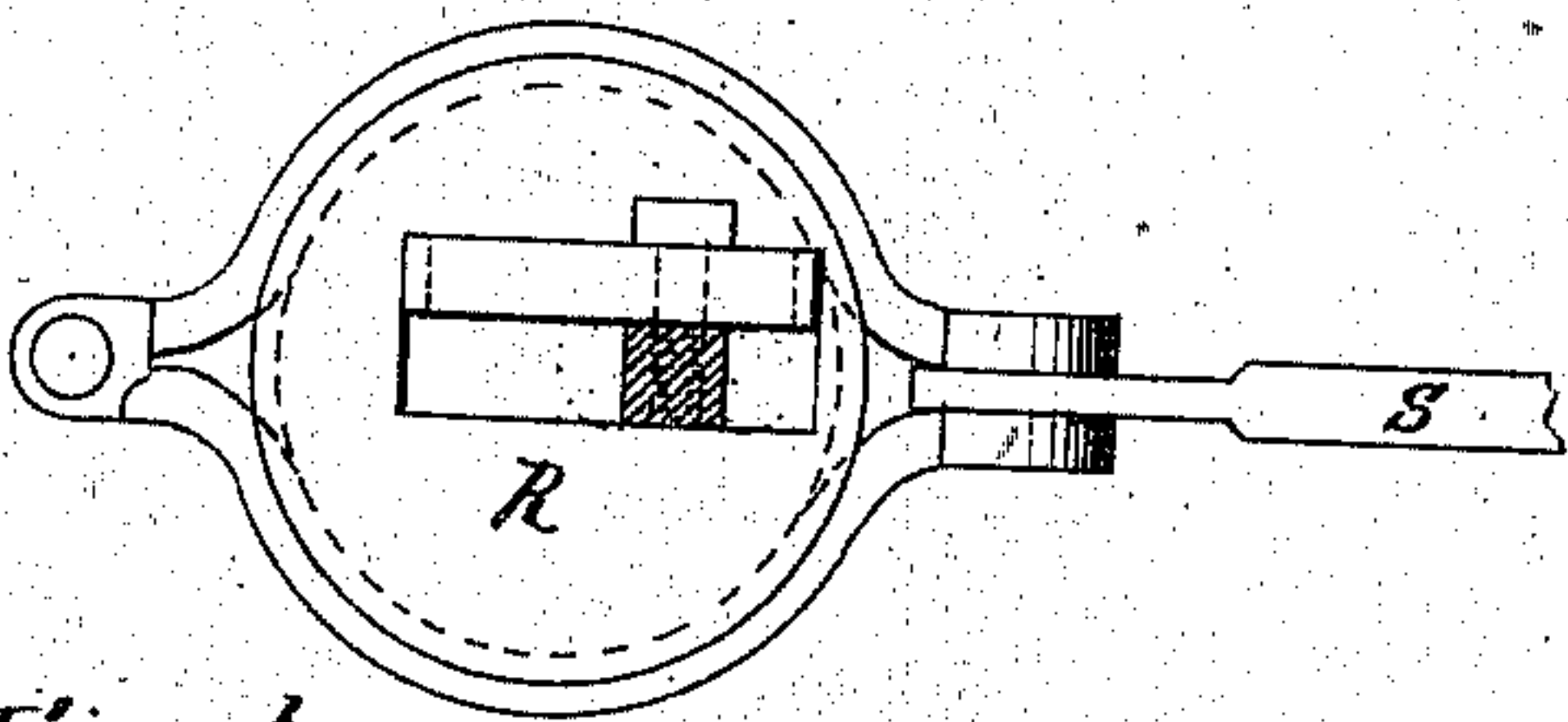
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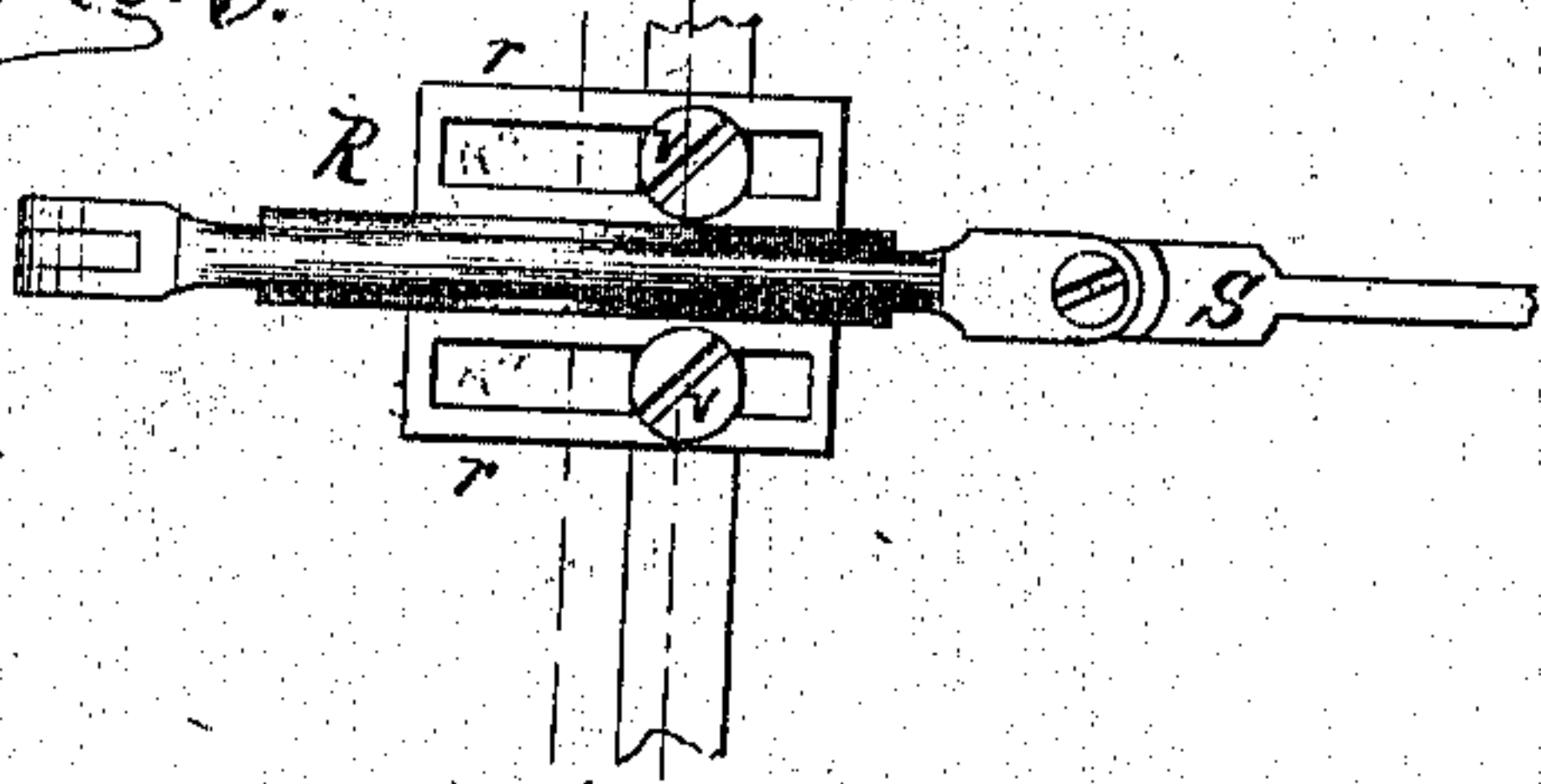
*Fig. 6.*



*Fig. 5.<sup>a</sup>*



*Fig. 5.<sup>b</sup>*

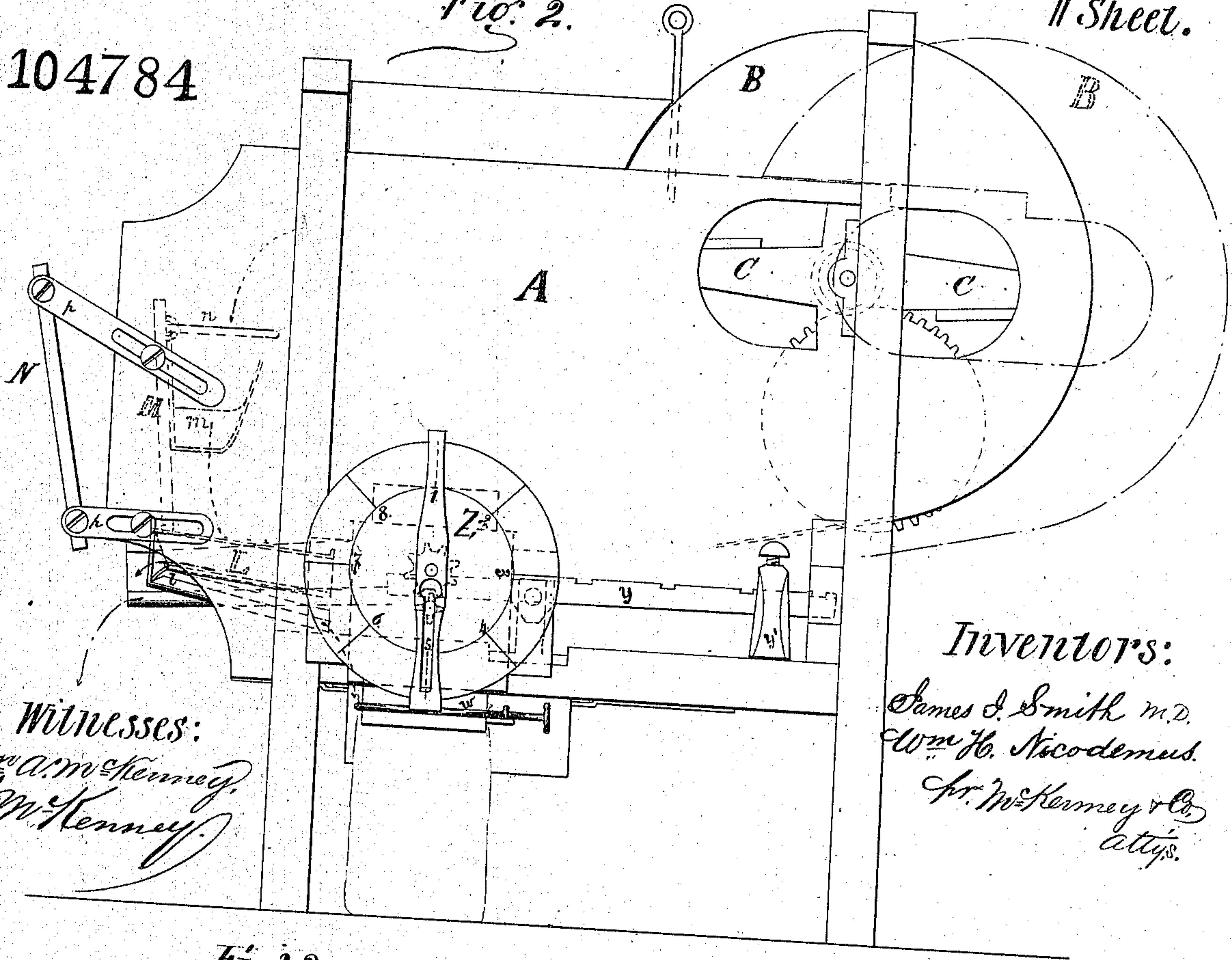




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Fig. 2.

11 Sheet.



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Fig. 3.

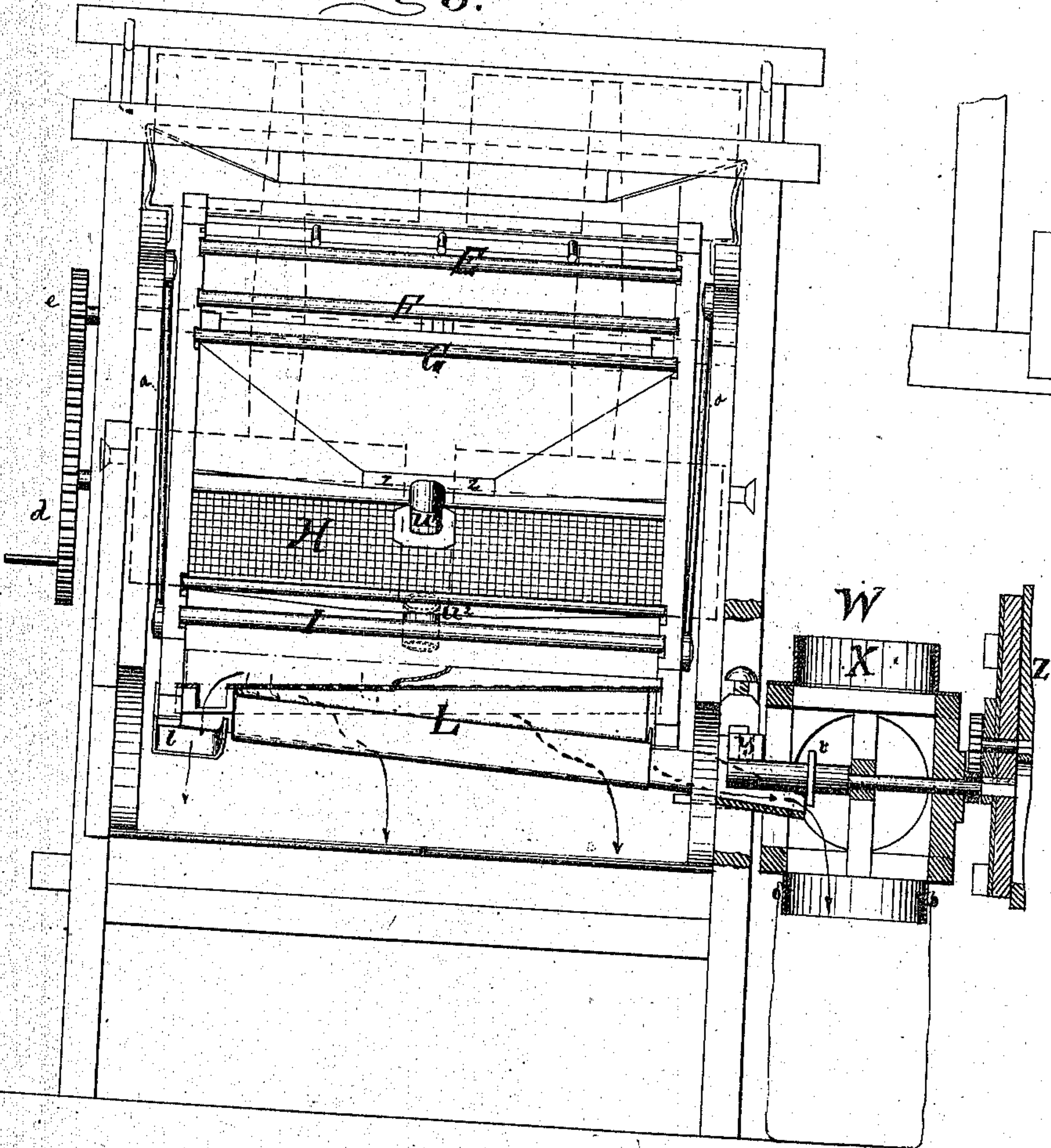


Fig. 4.

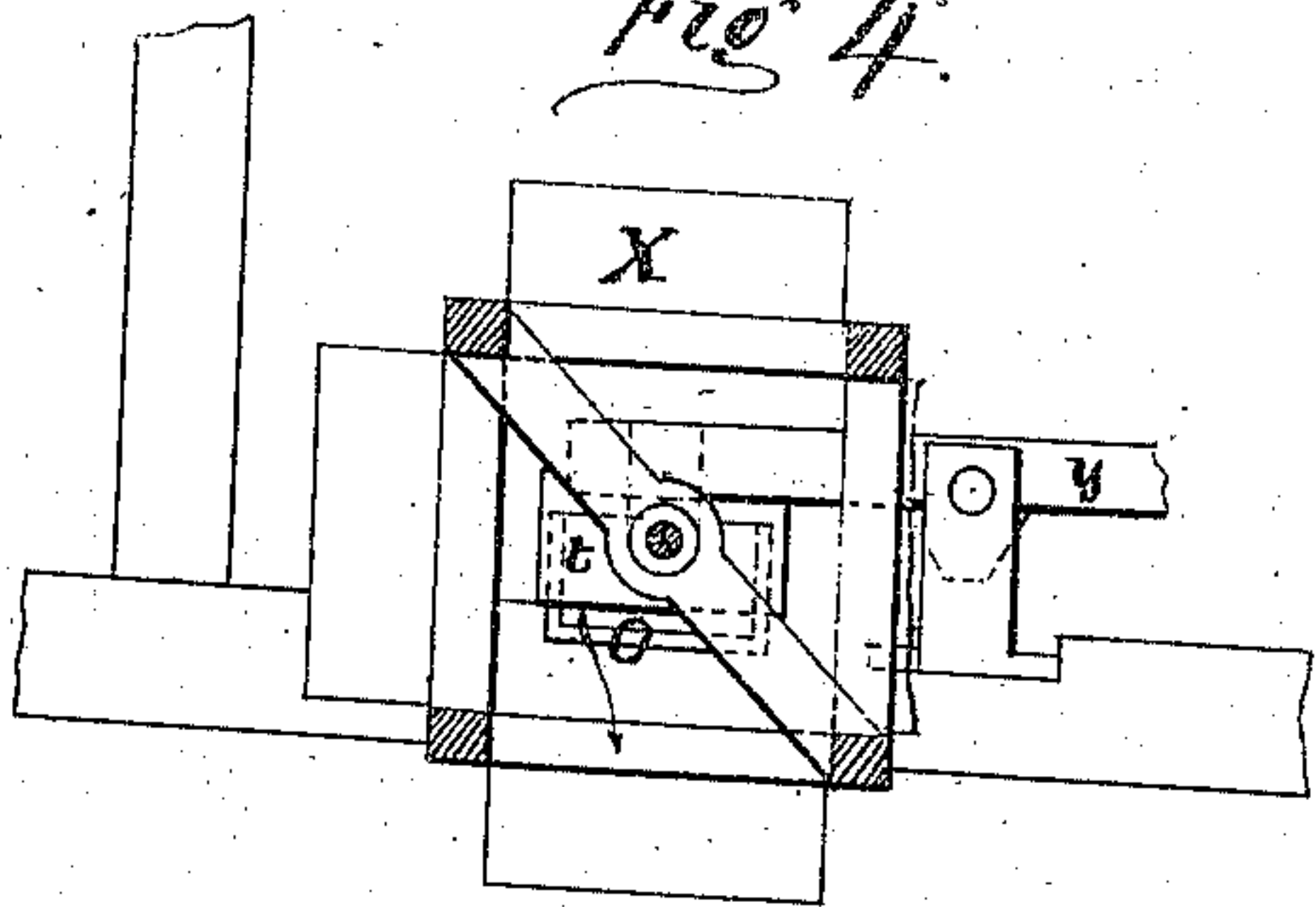
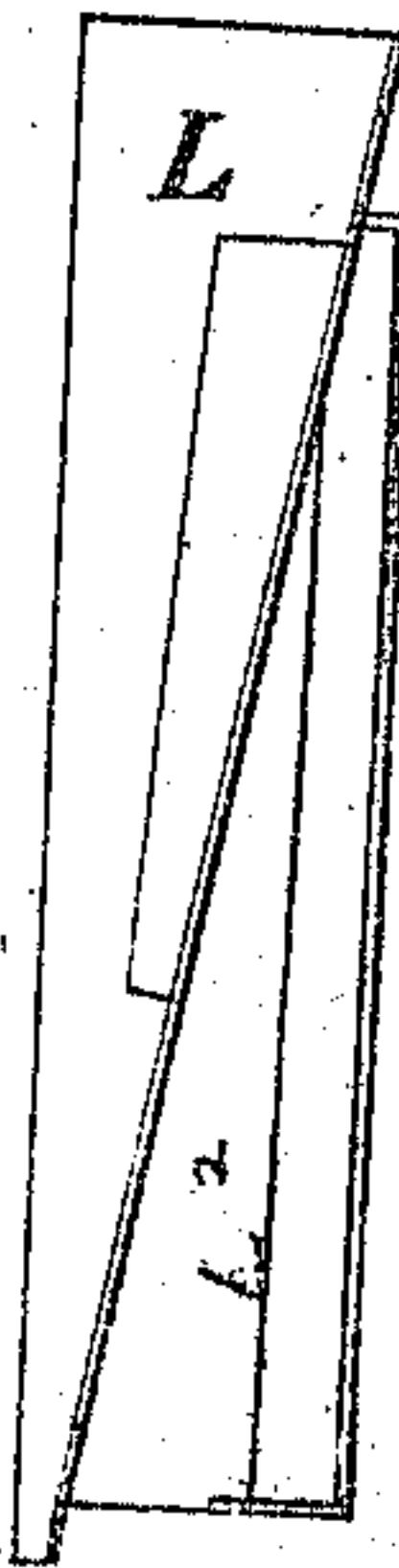
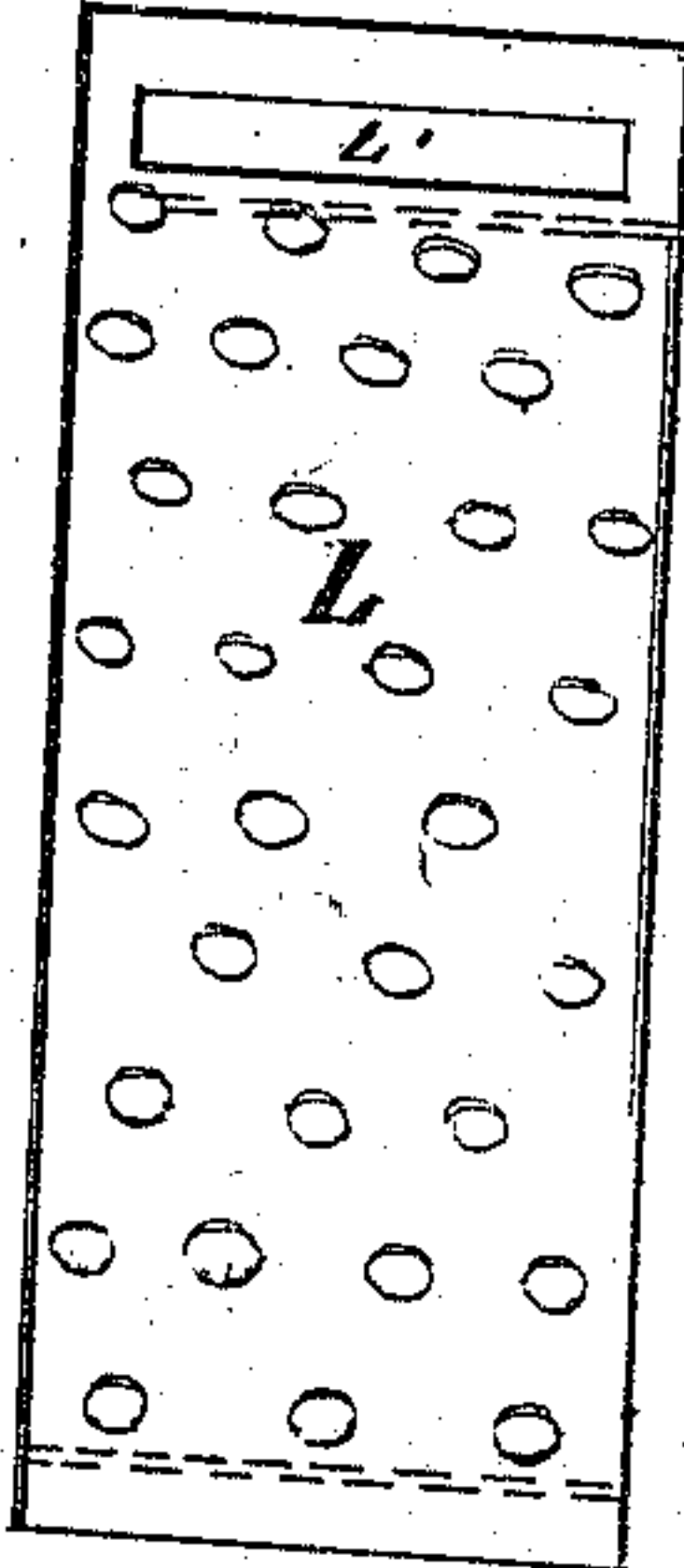


Fig. 7<sup>a</sup>

Fig. 7<sup>b</sup>





# United States Patent Office.

JAMES I. SMITH AND WILLIAM H. NICODEMUS, OF FREDERICK, MARYLAND.

Letters Patent No. 104,784, dated June 28, 1870.

## IMPROVEMENT IN GRAIN-FANNING AND SEPARATING-MACHINE.

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

To all whom it may concern:

Be it known that we, Dr. JAMES I. SMITH and WILLIAM H. NICODEMUS, of Frederick, in the county of Frederick and State of Maryland, have invented a new and useful Improvement in Grain-fanning and Separating-Machines, and we do hereby declare that the following is a full, clear, and exact description thereof.

The object of our invention is to produce a grain-fanning and separating-machine, which will have a greater capacity than those now in use, and will be, at the same time, more easily operated and less liable to get out of order. The nature of the same being that the fan is operated by an adjustable eccentric on the fan-shaft, and to which the shaker-bar is attached, and by which the riddle-carrier or shoe is operated, the shoe being hung on two bars, which are suspended from the inside near the top of the frame of the machine, on pivots, and are attached in the same manner to the shoe and near the bottom, allowing the riddles to have a full backward and forward motion, the riddles being held in the shoe by means of grooves in the sides of the same, the arrangement of the lower riddles being such that they culminate at the center and underneath.

Each riddle, with the exception of the two first or upper riddles, is furnished with a bottom or lining, and has double sliding and adjustable tubes, connecting each with the other, for the purpose of carrying off the chaff and waste, the lining of each riddle being depressed as it approaches the tubes.

At the rear of the machine is a novel attachment, consisting of an inner tail-board with chute attached, the tail-board screen and chute at one end of the screen. This device admits the use of the greatest amount of blast when there is a large proportion of garlic-clods, pebbles, and other extraneous matter in the grain. The chute attached to the inner tail-board allows the over-shot grain to fall on the screen, while the chute at the side of the shoe receives the garlic, &c., through the break or opening at the lower part of the screen, and empties it on the floor. Outside of this attachment is the adjustable tail-board, which is moved up or down near the mill or out from, as may be desired, to catch the headlings and tailing. It is made adjustable by the use of the slotted arms which support it.

To enhance the value and general utility of my machine, I have attached a most convenient and efficient weighing and bagging attachment, consisting of a graduated beam and weight, and a square revolving box, furnished on each side of the square with a projecting cylinder, each cylinder being arranged with a spring wire and catch to hold the bag in its place, and, as each bag is filled and removed, the weight of the next bag, hung on the cylinder above, turns the

revolver and brings the cylinder to which it is attached directly under the discharge-chute. The revolver has also attached on the outside a dial-plate and hand to register the number of bushels cleaned. On the beam of the weighing apparatus is attached a cut-off, working automatically over the mouth of the chute, so as to stop the flow of grain at any desired point, or when so much grain is weighed or measured.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation, reference being had to the accompanying drawing, which is made a part of this specification, and in which like letters indicate like parts.

Figure 1 shows an elevated section taken longitudinally through the center.

Figure 2 is a side elevation, and shows bagging and weighing apparatus.

Figure 3 is an end view, showing also the bagging attachment more fully.

Figure 4 is a section of the bagging attachment taken through the center.

Figure 5<sup>a</sup> is a side view of my adjustable eccentric.

Figure 5<sup>b</sup> is a top view of same, showing the manner of fastening on the fan-shaft.

Figure 6 shows the long riddle, with holes across the middle and the break in the lining, and also shows the position of the double pipes.

Figure 7<sup>a</sup> is a top view of the inner tail-board screen, with slotted end.

Figure 7<sup>b</sup> shows a side view of the same.

### Construction.

I make the frame A, fig. 2, of my machine, very much in the usual manner and style, except that the drum B, which incloses the fan C, is placed in a more elevated position than usual, and is made adjustable so that it may be removed at pleasure, and allowing room underneath for the riddle-box D, as shown in fig. 1.

The shoe or riddle-carrier is hung directly underneath the hopper, it being suspended from the sides of the frame by means of the bars *a a* hung from each side and near the top of the frame, and loosely attached to the shoe near the bottom.

The riddle-carrier is kept securely together by means of the transverse bars *b b*, which act as braces, and is grooved on the inside of its uprights in a peculiar manner, so as to admit of the novel arrangement of the riddles, which are placed in the shoe in the following manner:

The upper or straight wire riddle E is fixed in a groove in the ordinary manner, that is, in nearly a horizontal position and inclining slightly toward the rear of the machine, and is made of a number of metal rods set in the back of the riddle-frame several inches apart, and extended longitudinally, while the coarse



square-mesh riddle F is placed just below it, but in a perfectly horizontal position. Next to the riddle F, and below it, is placed the long double riddle G, which is inclined about an angle of  $30^\circ$ , and extends with its lower end almost under the fan C. This riddle is made with a bottom or lining, which is broken or slotted about the middle  $z z$ , while the riddle itself has four or more openings,  $x x x x$ , directly over the break in the lining, more clearly shown at fig. 6, so that only about one-half the grain traverses each portion of the riddle, the upper portion of which is square-mesh, and the lower portion is the long mesh, thus providing for a more thorough dispersion and screening of the grain. Directly under the middle and under the break  $z$  in the lining of the long riddle G, the long-mesh riddle H is situated, extending downward and at an equal angle with the long riddle, but in an opposite direction, and toward the rear of the machine.

Commencing at the bottom of the riddle H, and extending downward at about the same angle, and in a contrary direction, is another square-mesh riddle, I, terminating at the chute O, directly below the center of the long riddle G.

Underneath the lower end of the long riddle, and extending a little beyond it, and almost under the fan, is the last riddle K, which extends downward, at about the same angle with the other riddles, to the chute O, the three riddles H, I, and K, together with the lower half of the long riddle G, being arranged so as to conform to the shape of a lozenge or rhomb. Near the lower end of the bottom riddles, I and K, there is an opening or slot,  $c c$ , in the lining of each, at either side of the chute O, to allow the chaff and waste to escape to the screen-box, which is placed under the bottom of the machine and below the chute.

The riddles G, H, I, and K, are connected by double adjustable tubes  $u^1$ ,  $u^2$ , and  $u^3$ , as shown in fig. 1, that is, the tube  $u^1$  connects the lining of the upper part of the long riddle G with the lining of the riddle H. The tube  $u^2$  connects the lining of the riddle H with that of the riddle I, and the tube  $u^3$  connects the lining of the lower part of the long riddle G with the bottom of the riddle K, securing, by this arrangement, a free avenue of escape for all the chaff and screening, so that the same may empty into the screen-box, through opening  $c c$  in the lining of the riddles I and K, the lining of all the riddles being depressed as it approaches the tubes.

The advantages of making the tubes double, so as to be adjustable, is obvious, as, when it is desired to change or take out one of the riddles, the lower part of the tube is pressed up and out of the way, while the riddle is being withdrawn.

At the back of the shoe, and attached to it by hooks  $n$ , is the inner tail-board M, furnished with the chute  $m$ , which, when a great amount of blast is used, catches the overshot grain and other substances, and causes the same to fall into the chute  $m$ , by which it is conveyed to the tail-board screen L, which separates the grain from the garlic and other foreign substances. This screen is made in a peculiar manner, and is shown at L, figs. 7<sup>a</sup> 7<sup>b</sup>, and is something in the shape of an oblong box, open at the inner side, and having a perforated lid, the lid at the lower end extending of the edge of the box, and slotted, so as to allow the garlic and other foreign matter to fall into the chute  $l$ , which is attached to the shoe, which is inclined to the rear of the machine, and discharges the waste on the floor, while the grain passes through the perforations in the lid and in the box, and escapes from thence to the box underneath, which is provided for the overshot grain, or into the screen-box.

The fan C is made much in the usual way, except that the wings or fliers are separated at the middle, so as to admit of the play of the adjustable eccentric R.

The fan is operated by a cogged driving-wheel,  $d$ , working on a pinion,  $e$ , on the end of the fan-shaft. The eccentric R is made in the manner shown at figs. 5<sup>a</sup> and 5<sup>b</sup>, slotted so as to be adjusted on the fan-shaft. On each side of the slot in the eccentric the flanges  $r r$  are extended, which are also slotted, to admit the screws  $v v$  which enter the fan-shaft, and hold the eccentric R securely in place, after the same has been adjusted, so as to give the desired stroke to the shaker-bar S, which operates the shoe, and is attached to the transverse-bar  $k$  which extends across the shoe.

The weighing and bagging attachment is situated on the outside of the machine, near the bottom, and immediately in front of the chute O, and consists of a graduated beam,  $y$ , and weight,  $y'$ , the tenon of the beam  $y$  being let in the mortise on the shaft of the bagger, which extends through the bagger, and has a small pinion attached to its extremity. The bagging device W consists of a square revolving box, having an open cylinder, X, on each of the four sides, to which the bag is attached by means of the spring wire and catch  $w$ .

The indicator Z, which is placed on the outside of the bagger, is composed of a dial-plate and hand or indicator, the dial being graduated and marked with as many radiated lines as there are cogs in the wheel which moves the hand, and which is operated by working on the fixed pinion on the shaft of the bagger, so that, every time the bagger turns, the hand indicates it by moving forward one space. On the shaft of the bagger the cut-off  $t$  is placed, and works in front of the chute O, so that, the scale being set any certain number of pounds, the grain falling in the bag overbalances the weight on the beam and bears the shaft down, thus bringing the cut-off  $t$  over the mouth of the chute O, and stopping the flow of the grain.

#### Operation.

The machine being set in motion by turning the driving-wheel  $d$ , which imparts motion to the fan C by means of the pinion  $e$  and the eccentric R on the shaft, and from thence the motion is transmitted to the riddles by the shaker-bar  $g$ , attached to the shoe. The thrashed grain, chaff, heads, &c., being thrown in the hopper, fall from it to the straight-wire riddle E, and are separated, so as to fall in streams on the coarse square-mesh riddle F, the grain and fine screenings falling through, while the straw and coarse stuff is blown out. The grain and fine screenings fall on the long double riddle G, the grain traversing the length of the riddle, and a portion going through the break  $z$  in the center, and falling on the long-mesh riddle H, spreading over this, and dropping over the lower edge on the lower riddle I, from which it is discharged into the chute O, and carried to the bagging apparatus W. The grain which falls on the lower part of the long riddle G traverses it, and falls over its lower end, and on the bottom riddle K, which also discharges in the chute O, leading to the bagging and weighing apparatus.

The screenings are blown through the riddles, and upon their lining, and find their way through the tubes  $u^1$ ,  $u^2$ , and  $u^3$ , to the breaks or slots  $c c$ , in the lining of the bottom riddle, or on either side of the chute O, and escape to the waste or screen-box underneath, the course of the grain and screening being indicated in the drawing by arrows.

When a full blast is used, a quantity of the grain, together with the garlic, pebbles, &c., is often blown over the upper end of the long riddle G, and is thrown against the inner tail-board M, and falls into the chute  $m$ , on the tail-board, and is discharged from thence to the upper end of the head-board screen L, the grain dropping through the perforations, and in a box provided for the purpose underneath, while the garlic, pebbles, &c., pass out through the slot  $L'$ , shown in



fig. 7<sup>a</sup>, in the lower end of the screen, into the chute *l*, on the inside of the shoe, and fall upon the floor.

Having thus fully described the construction and operation of our invention,

What we claim as new, and desire to secure by Letters Patent, is—

1. The long double riddle *G*, fig. 6, with the openings *x x x* across the middle, and having a bottom or lining, said lining being slotted across the center *z z*, and furnished with the double adjustable pipes *u*<sup>1</sup> and *u*<sup>2</sup>.

2. The arrangement of the long riddle *G*, in connection with the riddles *H*, *I*, and *K*, all lined, the lining in the lower riddles *I* and *K* being slotted at *c c*.

3. The inner tail-board riddle *L*, slotted at *L*<sup>1</sup>, and furnished with bottom *L*<sup>2</sup>, figs. 7<sup>a</sup> and 7<sup>b</sup>, constructed and arranged substantially as shown and described.

4. The inner tail-board *M*, furnished with chute *m*, and attached to shoe by hooks *n*, constructed and arranged substantially as shown and described.

5. The tail-board *N*, with slotted arms *p p*, constructed and arranged substantially as and for the purposes set forth.

6. The eccentric *k*, made adjustable on the fan-shaft by means of the screws *v v*, slots *v*<sup>2</sup> *v*<sup>2</sup> in frame *r r*, constructed and arranged substantially as shown and described.

7. The weighing and bagging device *W*, consisting of the scale *Y*, the square revolver *X*, the indicator *Z*, the cut-off *t*, with the spring wire and catch *w*.

8. The combination and arrangement of the fan *C*, with its adjustable eccentric *B*, in connection with the shaker-bar *S*, the riddles *E F G H I K*, the double and adjustable pipes *u*<sup>1</sup>, *u*<sup>2</sup>, and *u*<sup>3</sup>, the screen *L*, the tail-boards *M* and *N*, with the chutes *m* and *l*, all arranged, constructed, and operated substantially in the manner hereinbefore fully set forth and described.

The above specification of our improvement in grain-fanning and separating-machines signed this 6th day of April, A. D. 1870.

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WM. H. NICODEMUS.

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