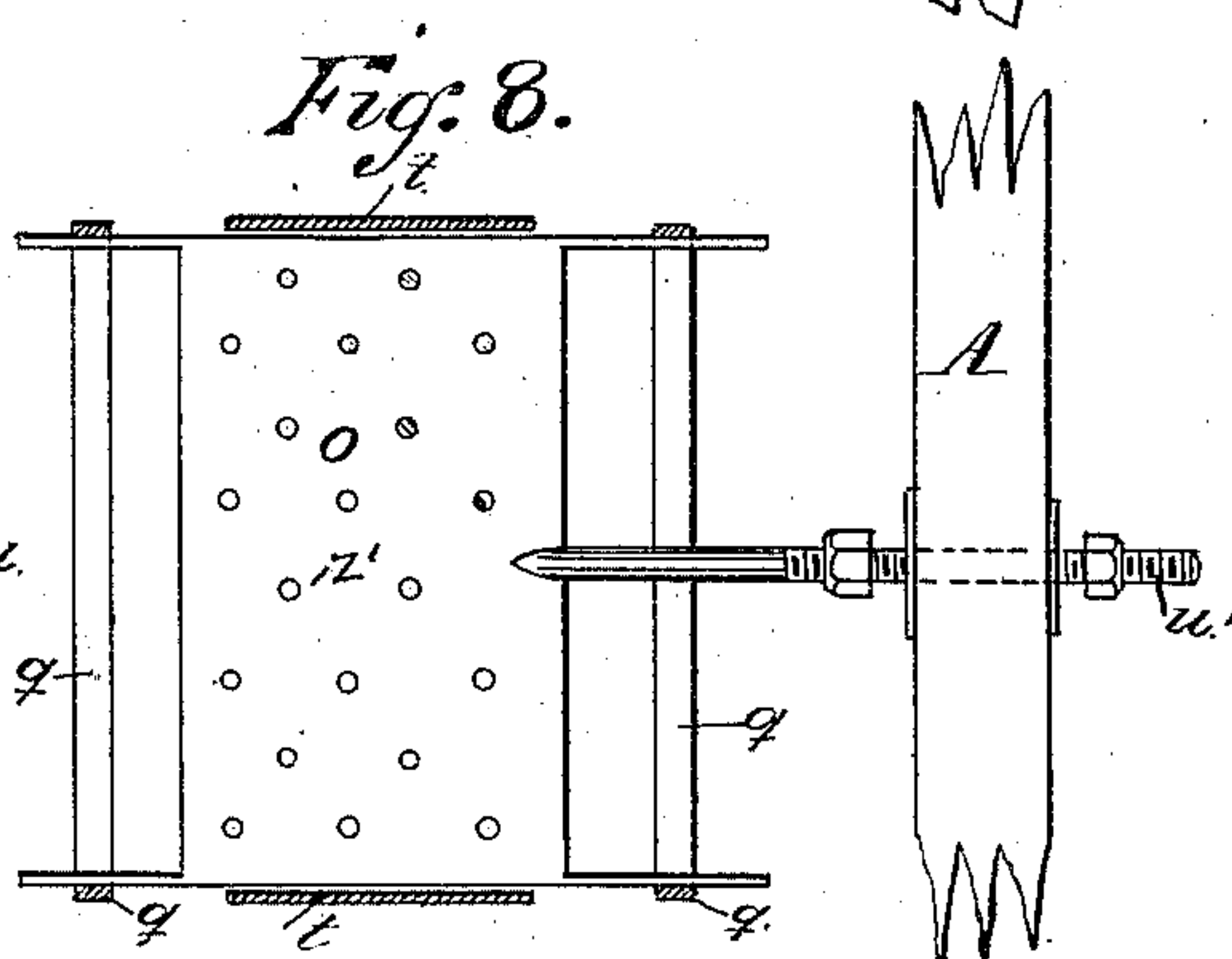
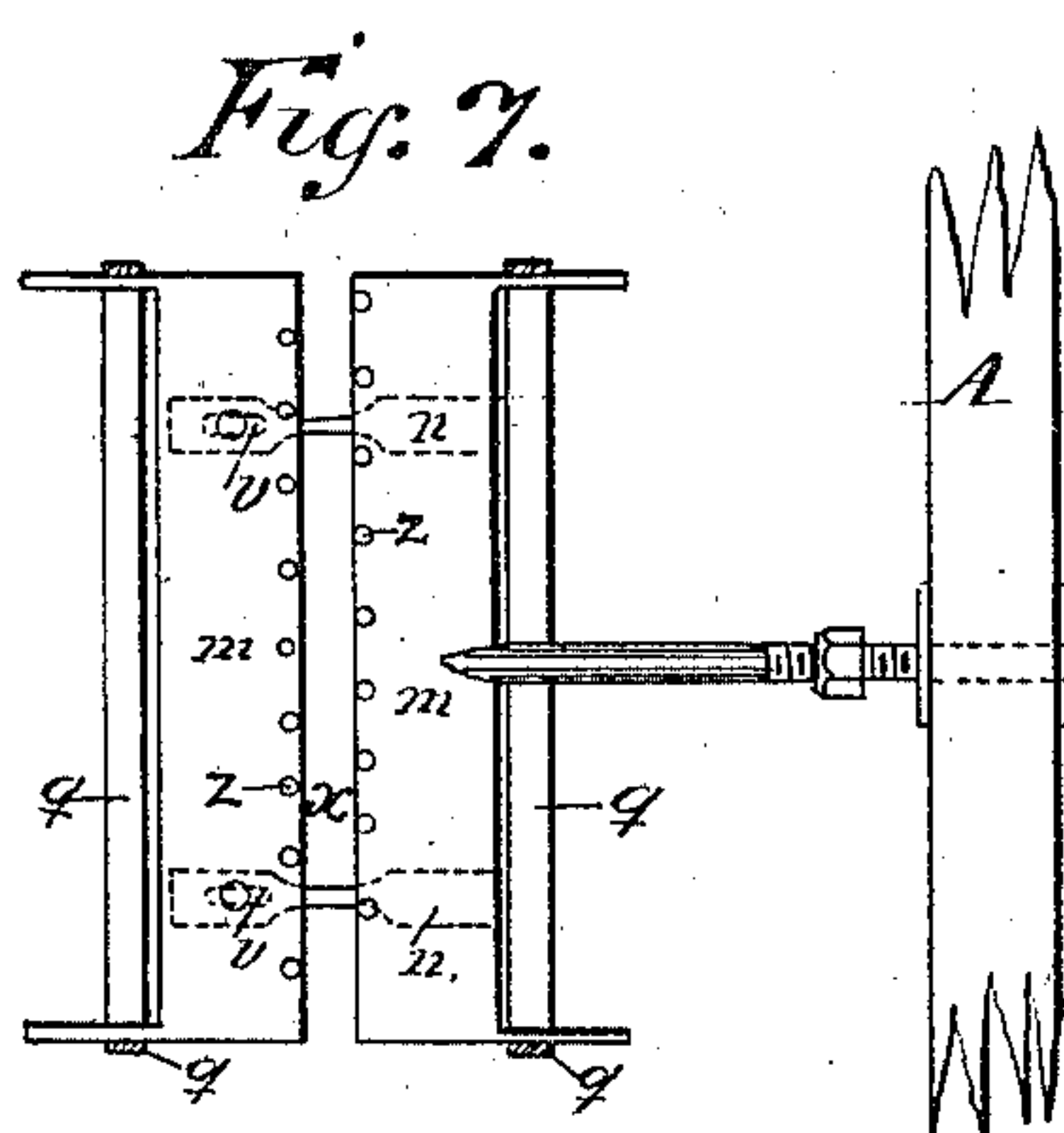
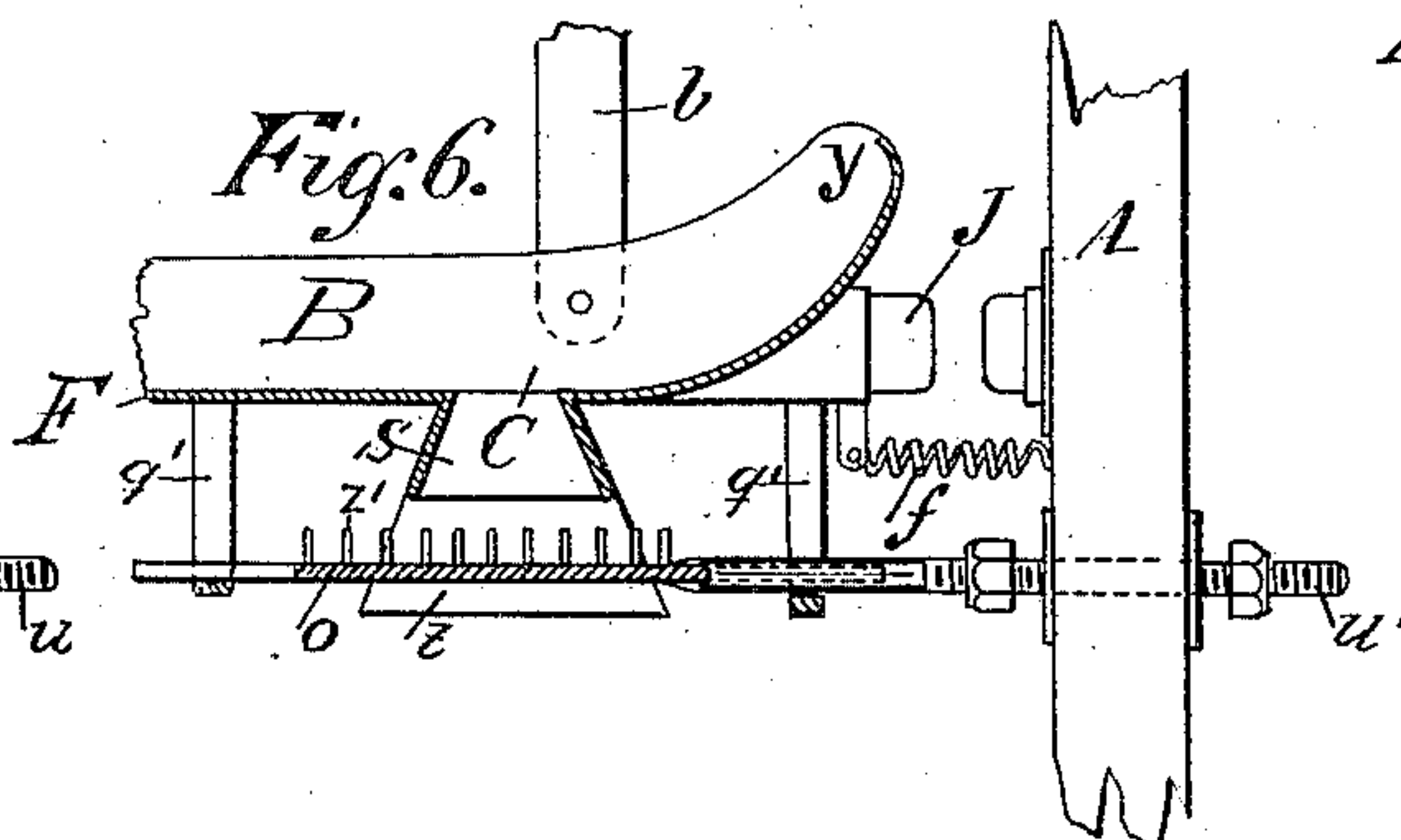
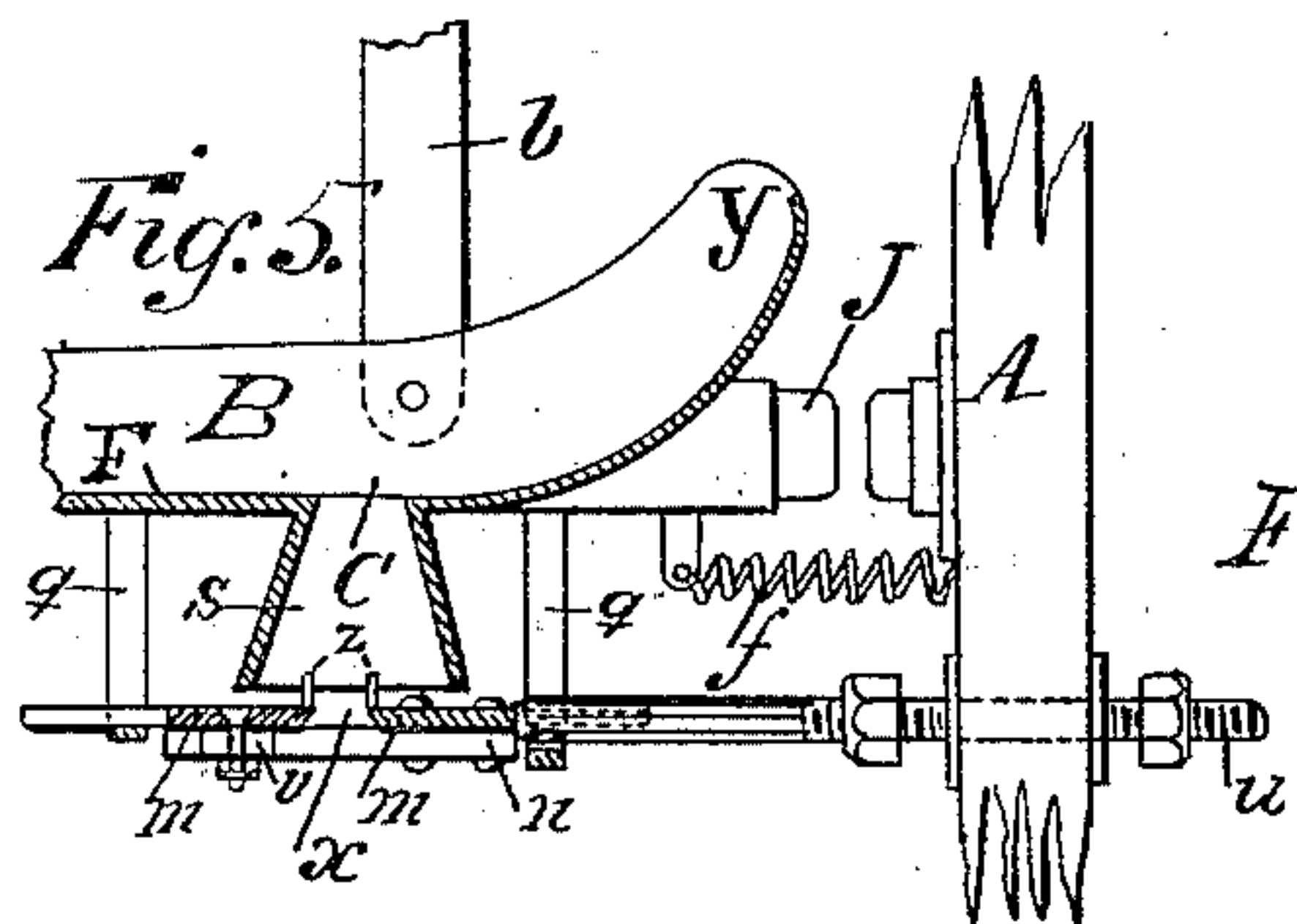
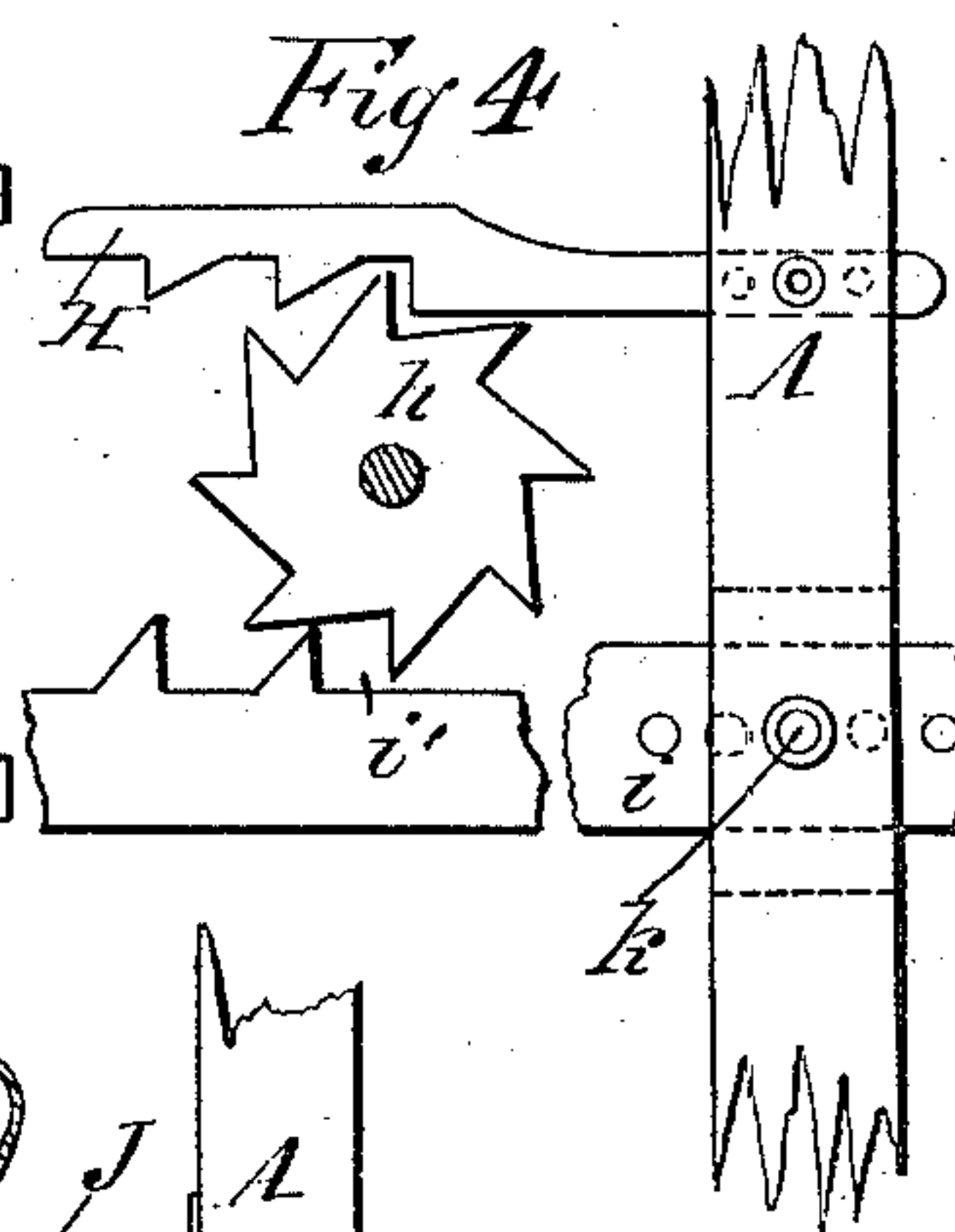
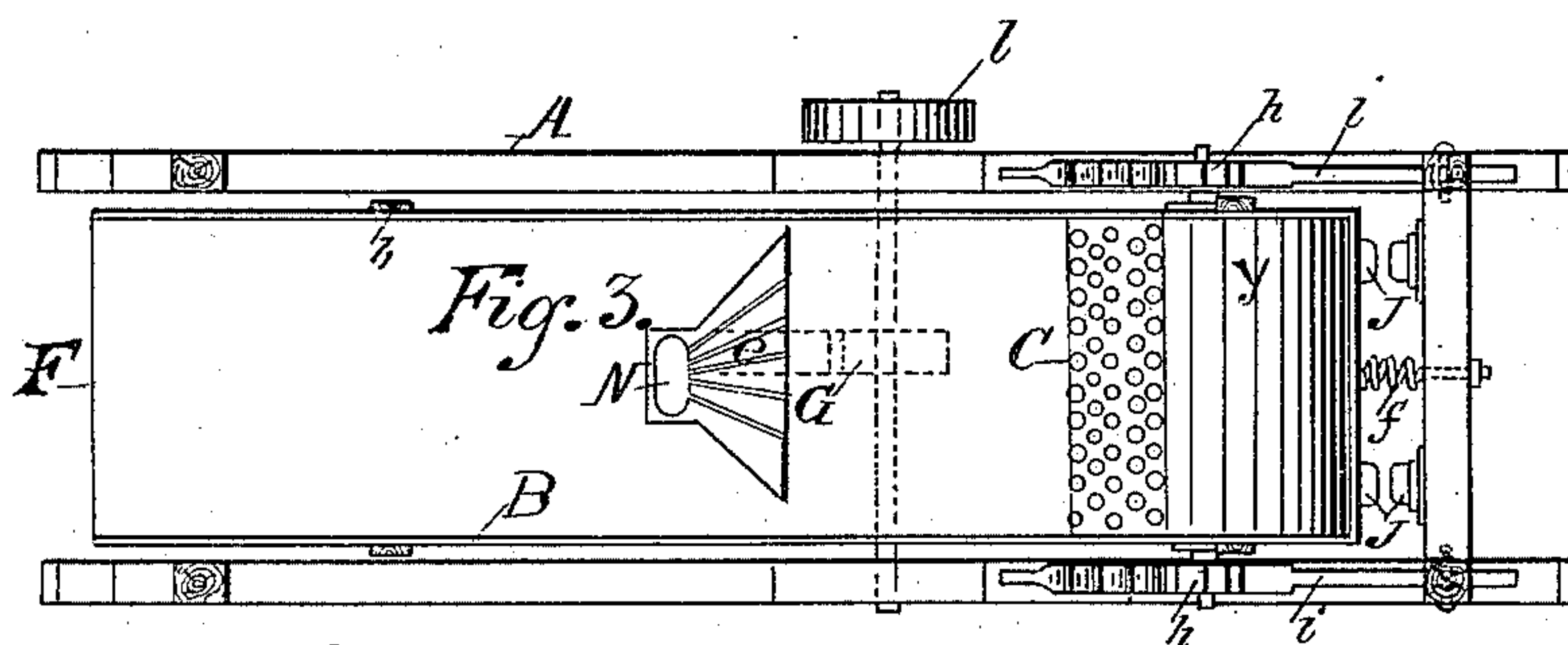
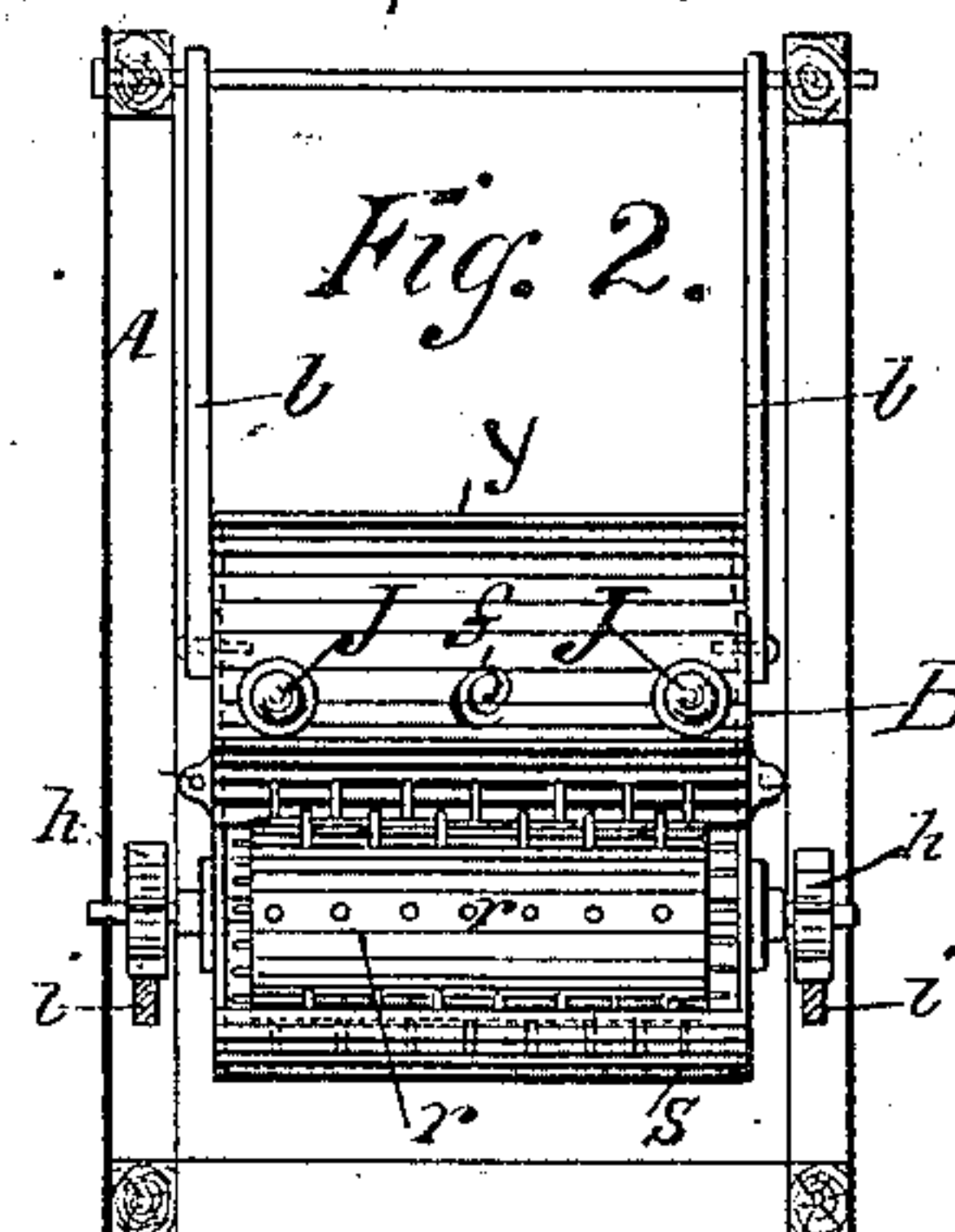
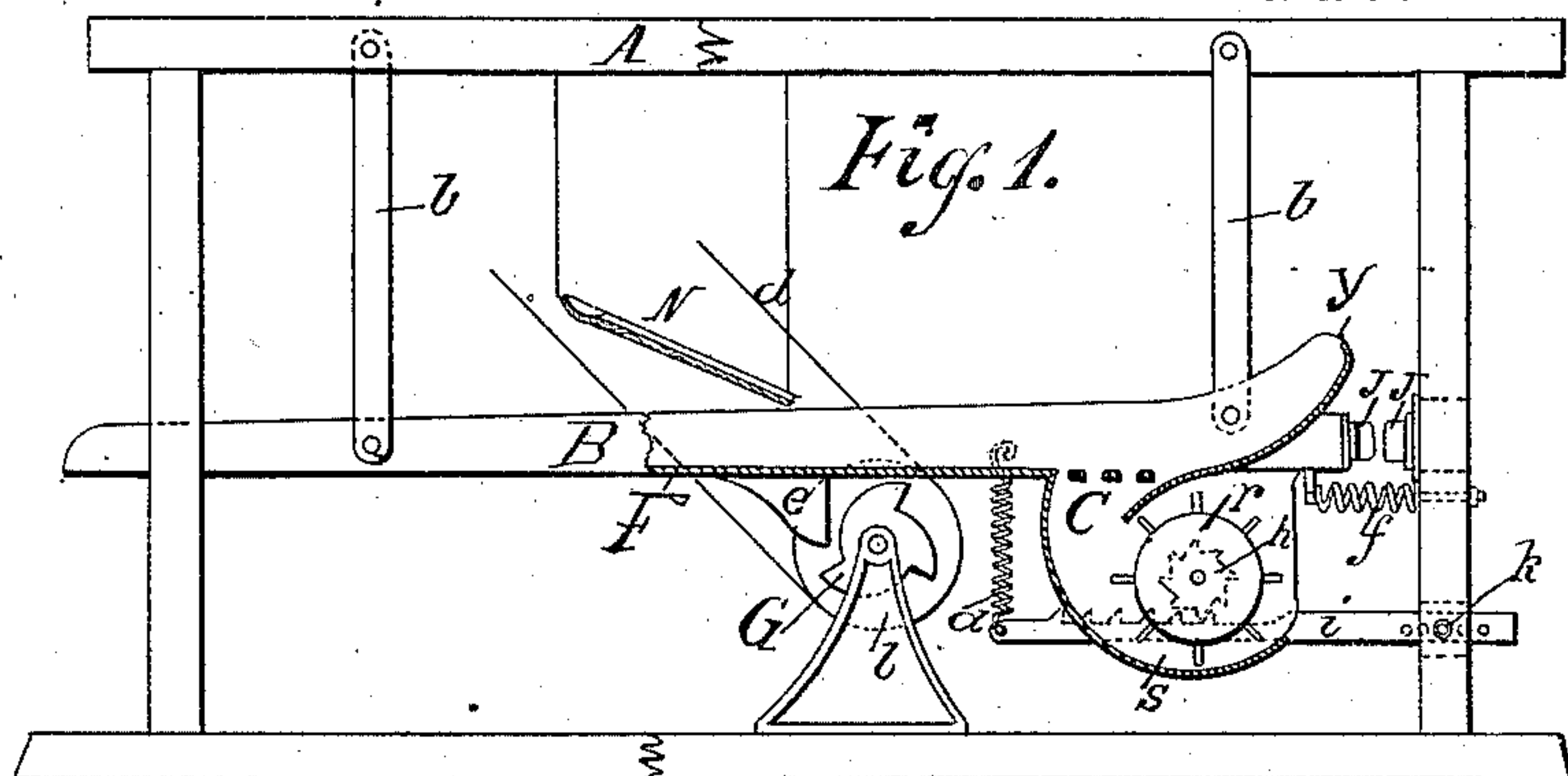


(No Model.)

A. A. KENT.  
ORE CONCENTRATOR.

No. 312,863.

Patented Feb. 24, 1885.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

ARTEMAS A. KENT, OF DENVER, COLORADO.

## ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 312,863, dated February 24, 1885.

Application filed October 17, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, ARTEMAS A. KENT, a citizen of the United States, residing at the city of Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Ore-Concentrator, of which the following is a specification.

In washing ores for the purpose of separating gold, silver, and other mineral substances from the gangue and earthy matter, I employ what is known as a "concussion-table" or "settling-pan," constructed with a flat bottom closed at the sides and one end, and at or near the closed end I provide an open space through the bottom, through which the mineral or concentrates may escape as they are collected there by the concussive motion of the table or pan. I also provide a suitable receiver beneath, and in connection with the said opening, for the purpose of receiving and retaining a sufficient quantity of the concentrates to form a body of a suitable density to prevent the escape of water to any considerable amount, and also to prevent the concentrates or the contents of the table from passing, except as they are discharged by a regulating device working in connection therewith, which insures the regular discharge of the proper amount, according to the quantity accumulated by the working of the machine—that is to say, if the discharging capacity is in excess of that required by the amount of mineral to be discharged, then more or less of the gangue matter will pass out with it, and the quality and value of the concentrates will be correspondingly reduced, in which case the discharging capacity should be proportionately diminished. On the other hand, if the discharging capacity is not sufficient for the proper escape of the mineral as it is collected, then more or less of it will pass off with the gangue and be lost, in which case the discharging capacity should be properly increased.

In this combination the receiver is carried by the table, and the said rasing device is arranged to operate upon and remove the packed concentrates from the receiver at a point away from the table-opening and discharge it in regulated quantities at the outlet end of the receiver, according to the amount passing into it from the table. This rasing or regulating device is adapted to have more or

less motion in unison with that of the table, for the purpose of regulating the discharge from the receiver, and the form of the latter is immaterial, so long as it is adapted to be packed with the substance passing from the table, and to hold it in a packed condition by the co-operating action of a regulating discharging device operating to loosen and remove the substance at a point below the table-opening, leaving the latter free for the collection of the concentrates within the receiver; nor is the specific form of the regulating device material; nor whether its grating or rasping action is effected by a rotary or a sliding movement, so long as it is in such relation to the discharge end of the receiver as to cause the concentrates packed therein to be discharged therefrom, and to leave the table-opening always free for the descent of the concentrates into the receiver.

The accompanying drawings illustrate my improved concentrator, in which Figure 1 represents a side elevation of the working parts of the machine, showing means for supporting the table or pan, also the location of the discharge-opening through the bottom, a receiver in connection therewith provided with a cylinder-regulator for properly removing the concentrates as they are collected within the receiver by the operation of the machine; Fig. 2, an end view showing more especially the construction and position of a cylinder-regulator; Fig. 3, a top view of the machine, illustrating the open space C in the bottom of the table or pan for discharging the concentrates, as a series of round holes, or they may be of any other form, or the entire space may be left open; Fig. 4, a detached view of the ratchet wheel and bar for operating a cylinder-regulator; Fig. 5, a side elevation of parts sufficient to show an open adjustable gate-regulator, in connection with the discharge-opening, of which Fig. 7 is a plan; Fig. 6, a side elevation of parts, illustrating a gate-regulator with roughened surface or spurs extending upward, of which Fig. 8 is a plan.

The table or pan, of which F represents the bottom, B the sides, and y the closed end, is supported in frame A by means of hangers b. Cam G, driven by pulley l, having its bearings upon frame A, works against bracket e, which moves the table in a direction opposite



to its closed end, and when released from the cam, as it revolves, spring *f* causes it to move back to its former position in a direction toward its closed end, and in so doing brings the bumpers *J J* forcibly together, the concussion having a tendency to move the contents of the table toward the discharge-opening *C*. The necessary concussion may be produced by any suitable device. Under these circumstances, if ore, with a suitable supply of water, is fed onto the distributor *N*, thence onto the table, the continuous agitating motion thereof will settle the mineral through the gangue onto the table, and the concussive blow at the closed end will move it in that direction until it arrives at and finally escapes through the discharge-opening *C*. Meanwhile the gangue and earthy substances will pass off with the water in the opposite direction at the open end of the pan.

The discharge-opening *C* is provided with a receiver, *S*, into which the concentrates pass and become packed to such a density that but very little water will pass through, and to properly discharge the concentrates from this receiver I employ some regulating device that will loosen them from beneath and cause or allow them to pass out, and at the same time regulate the amount discharged according to the amount that is being collected by the workings of the machine. Figs. 1, 2, and 3 illustrate for this purpose a cylinder, *r*, with spurs or roughened surface, the receiver *S* being suitably constructed in concave form to accommodate and assist its proper workings. The journals of this cylinder have their bearings in the ends of the receiver-box *S*, beyond which they extend sufficiently to support and firmly connect with the ratchet-wheels *h*. The ratchet-bars *i* are pivoted in mortises through parts of frame *A*, at *k*, in suitable positions to work in connection with wheels *h*, and the working ends of these bars are held in proper position to connect with wheels *h* by springs *d*. The ratchets are so arranged that as the table is moved in the direction toward its open end they connect, and the cylinder *r* is thereby rotated; its roughened surface, working against the contents of the receiver *S*, loosens and discharges an amount of concentrates in proportion to the motion imparted to it. When the table moves in the opposite direction, the ratchets slide past each other without effect upon the cylinder, the springs *d*, that support the ratchet-bars, allowing them to yield sufficient for that purpose.

To rotate the cylinder by each backward and forward motion of the table, (in case more motion should be needed than a single stroke would give,) other ratchet-bars may be used above the wheels *h*, as shown in Fig. 4 at *H*, or a continuous motion may be applied by the use of gears or any suitable device.

To increase the discharging capacity of this form of regulator, give it more motion, as already explained, and to diminish it give it less motion, and if a full connection of the

ratchets on one side of the wheels *h* should prove to be too much in any case, then set the bar *i* out from its fastenings until a space, as at *i'*, Fig. 4, would be left as the wheel *h* passed back over the bar for another stroke.

The regulating of the amount discharged from the receiver is important, and in the rotary form of regulator this is provided for by the adjustment of the bar *i*, by means of extra holes in its pivoted end, so that the space *i'*, Fig. 4, between its teeth and the teeth of the ratchet-wheel *h* will be increased or diminished, and hence, as the extent of the reciprocating movement of the table is not changed, the degree of the intermittent rotation of the cylinder-regulator will be increased or diminished by the contact action of the ratchet-teeth by the movement of the table. To increase the discharge from the receiver, set the bar *i* outward to lessen the space *i'* between the ratchet-teeth to give the cylinder greater movement; to diminish the discharge, set the bar inward. In this way the rotation of the cylinder at intervals can be regulated to turn through greater or less arcs of motion at each interval movement of the table. In a gate-discharge regulator the same result is obtained by increasing or diminishing the extent of the horizontal interval movements of the gate-regulators. (Shown in Figs. 5 and 6.) This form of discharge-regulator is supported in horizontal position at the outlet end of the receiver by resting freely upon the lower horizontal cross-bars of frames *g g'*, rigidly connected to the sides of the table, and depending therefrom at each side of the receiver. In this gate-discharge the extent of the interval movements are adjusted and controlled by the nuts on the screw-rod *u*, which latter, being attached to the gate, passes through a guide in the frame *A*. The nuts serve as stops to the back-and-forth interval movements of the gate, and by setting them closer together upon the rod on each side of the frame-guide the extent of the interval movements of the gate will be lessened, and vice versa, such movements being effected by the friction of the packed substance in the table-receiver resting upon the gate. As the table moves it will by the friction of the packed substance move the gate till the nut strikes the frame-guide and stops the gate. The extent of the movement of the table being greater than that of the gate, the latter will commence to discharge the packed substance the moment its movement is arrested in either direction, such discharge taking place at each side of the outlet end of the receiver. These two forms of gate discharge I will now more particularly describe.

Figs. 5 and 7 illustrate a form of gate-discharge regulator in which the gate *m* is shown to part in the center, leaving an open space, *x*, through which the contents of receiver *S* may escape, as they are loosened by passing backward and forward across the surface of



the gate, the gate moving but little, while the receiver, with its contents, passes over it with the motion of the table to which it is attached. The edges of the gate next to the open space are provided with spurs  $z$ , to assist in loosening the packed contents of receiver  $S$ . This gate is held in proper position in relation to the under side of the receiver by frame-work  $g$ , depending from the table  $B$ . The two parts of the gate  $m$  are connected by ties  $n$ , one end of each being firmly attached to one side of the gate, and the opposite end provided with a slotted bolt-hole, which allows the space  $x$  to be enlarged or contracted by adjusting the parts to or from each other. The gate is held in horizontal working position by means of the screw-bar  $u$ , which passes loosely through a part of frame  $A$ , and being provided with a nut on either side of the frame, the gate may thereby be adjusted to any position found necessary in regulating its discharging capacity.

To increase the discharging capacity of this form of regulator, enlarge space  $x$ , and, if necessary, place the nuts on bar  $u$  nearer together. To diminish the capacity, contract space  $x$  and move nuts on bar  $u$  farther apart.

O, Figs. 6 and 8, represents another form of gate-regulator, the upper surface of which is provided with spurs  $z'$ , over which the receiver  $S$  passes, in connection with the table to which it is attached, and in thus passing to and fro its contents are released by the spurs and escape over the edges of the gate. Lips  $t$  extend from the ends of the receiver down past the sides of the gate to prevent escape of the concentrates in that direction, and the gate is made of sufficient length to prevent them escaping too freely at the ends.

This form of regulator is supported by frame  $g'$  and adjusted by bar  $u'$ , in the same manner as described in connection with Figs. 5 and 7, and the discharging capacity is increased or diminished by adjusting the nuts on rod  $u'$ , as before explained; and by placing the upper surface of the gate nearer to the under side of the receiver the discharge would also be diminished, and increased by making the space between them greater.

I have stated that the object of the receiver is to retain a sufficient quantity of the concentrates passing from the table to form a body of suitable density to prevent the escape of water through said receiver to any considerable amount; and also to prevent the concentrates from passing out of said receiver, except as they are discharged by a regulating device operating within said receiver. I have also stated that in this function the receiver is carried by the table, and that the discharge therefrom is in quantities regulated according to the quantity accumulated therein by the working of the machine, such discharge being effected by a rasping action of the regulator. In explanation of the functions of these parts, it is seen that the receiver forms a chamber open

at both ends—that is, it has a receiving-opening and a discharging-opening—and that within its chamber-space the material passing from the table is retained, and in settling therein becomes packed with more or less density against the regulator. It is this packed body which prevents the free passage of the water from the table through the receiver. Against this packed body moves a roughened or armed surface which takes away the material by a picking-off or rasping action, so that the constant settling down of the concentrates maintains the contact of the body with the picking-away device and the packed condition of the receiver, which condition is important in carrying out the object of my invention.

Roller-discharges for ore washers and concentrators are used in various ways in connection with tables and sluices having discharge-openings; and also in connection with "concussion-tables," and these known things are used as elements in the organization of my improved ore-concentrator, whereby to effect a new operation with advantageous results in the treatment of gangue and earthy matters for the saving of precious metals.

I claim—

1. In an ore-concentrator, the combination, with a reciprocating concussion-table having a discharge-opening and an open depending receiver, of a movable discharging-regulator arranged to operate below the receiving end of said receiver, whereby the receiver is kept in a packed condition with the concentrates, and its removal effected and regulated by a positive rasping or picking-away action of the regulator under the co-operating movement of said table, substantially as described, for the purpose specified.

2. The combination, in an ore-concentrator, of a reciprocating concussion-table having a discharge-opening, and an open depending receiver with a rotary toothed discharging-regulator arranged to operate within the receiver below its receiving end to allow the latter to pack with the concentrates, and connections whereby said regulator is operated by the movement of the table to effect the discharge of the concentrates from the filled receiver by a positive regulating action, substantially as described, for the purpose specified.

3. In combination, a concentrating-table having a concussion movement and a discharge-opening, a feeder for the ore and water, an open receiver,  $S$ , depending from the table, a movable discharging-regulator arranged to operate below the receiving end of said receiver, suspension-mountings for said table, and connections by which said regulator is operated to effect a gradual and regulated discharge of the concentrates from a packed receiver, substantially as described, for the purpose specified.

4. The combination, with a reciprocating concentrating concussion-table having a discharge-opening, and an open depending re-



ceiver, S, with a movable discharging-regulator arranged to operate within the discharging end of said open receiver, and operating-connections for said regulator controlled and  
5 adjusted to regulate the discharge and to maintain a packed condition of said receiver, substantially as described, for the purpose specified.

10 5. In combination, in an ore-concentrator, a reciprocating concentrating concussion-table having a discharge opening, an open depend-

ing chamber forming a receiver, a rotary toothed discharging-regulator arranged below the receiving end of said receiver, the ratchet-wheels *h*, and the adjustable yielding ratchet-bars *i*, all constructed and arranged substantially as described, for the purpose specified. 15

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