

(No Model.)

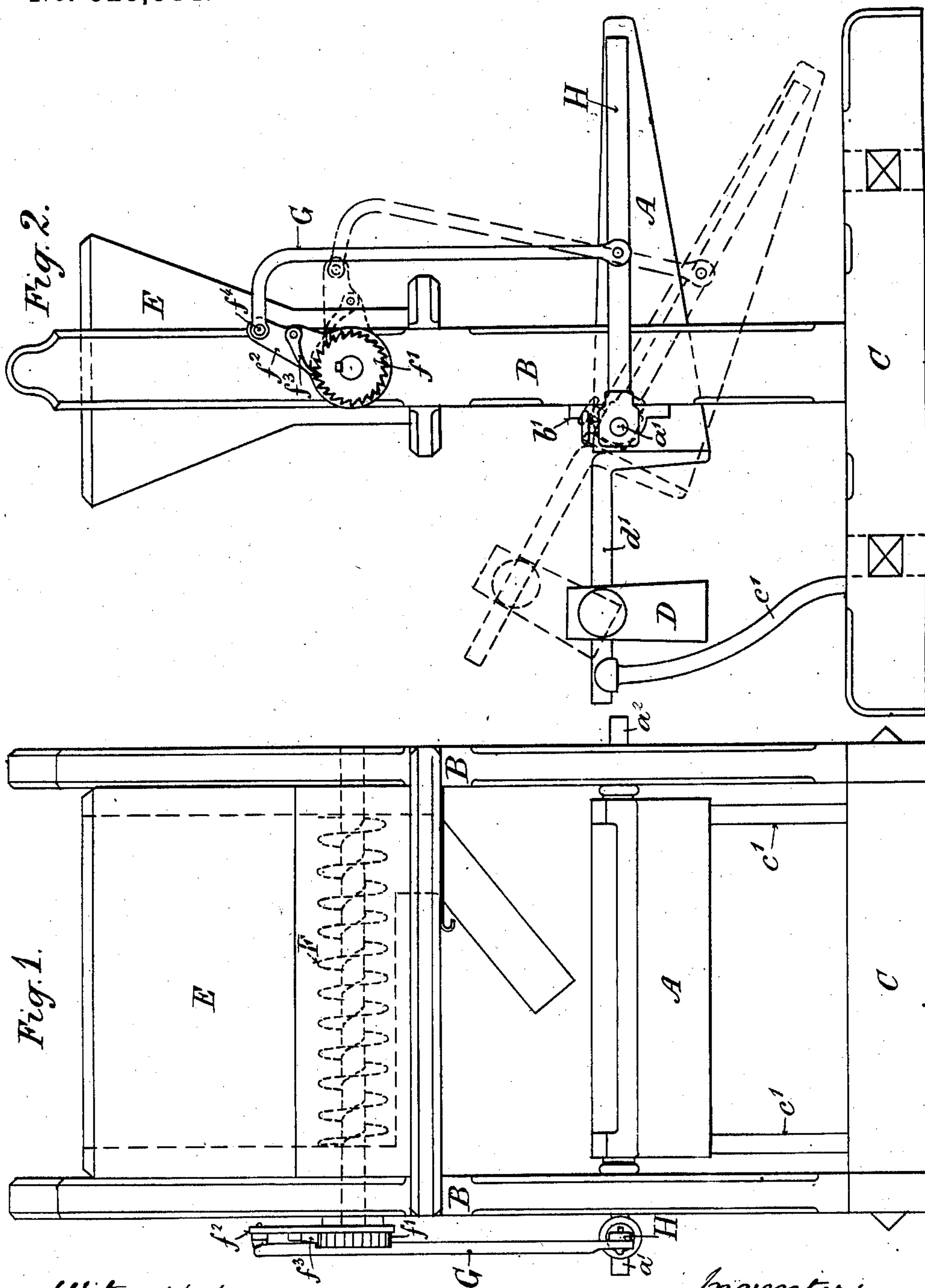
5 Sheets—Sheet 1.

S. K. PAGE, C. E. ROBINSON & W. STEVENS.

APPARATUS FOR THE TREATMENT OF SEWAGE.

No. 328,334.

Patented Oct. 13, 1885.



Witnesses  
J. A. Rutherford  
Robert Everett.

Inventors  
Samuel H. Page  
Charles E. Robinson  
William Stevens.  
By James L. Norris, Att'y.

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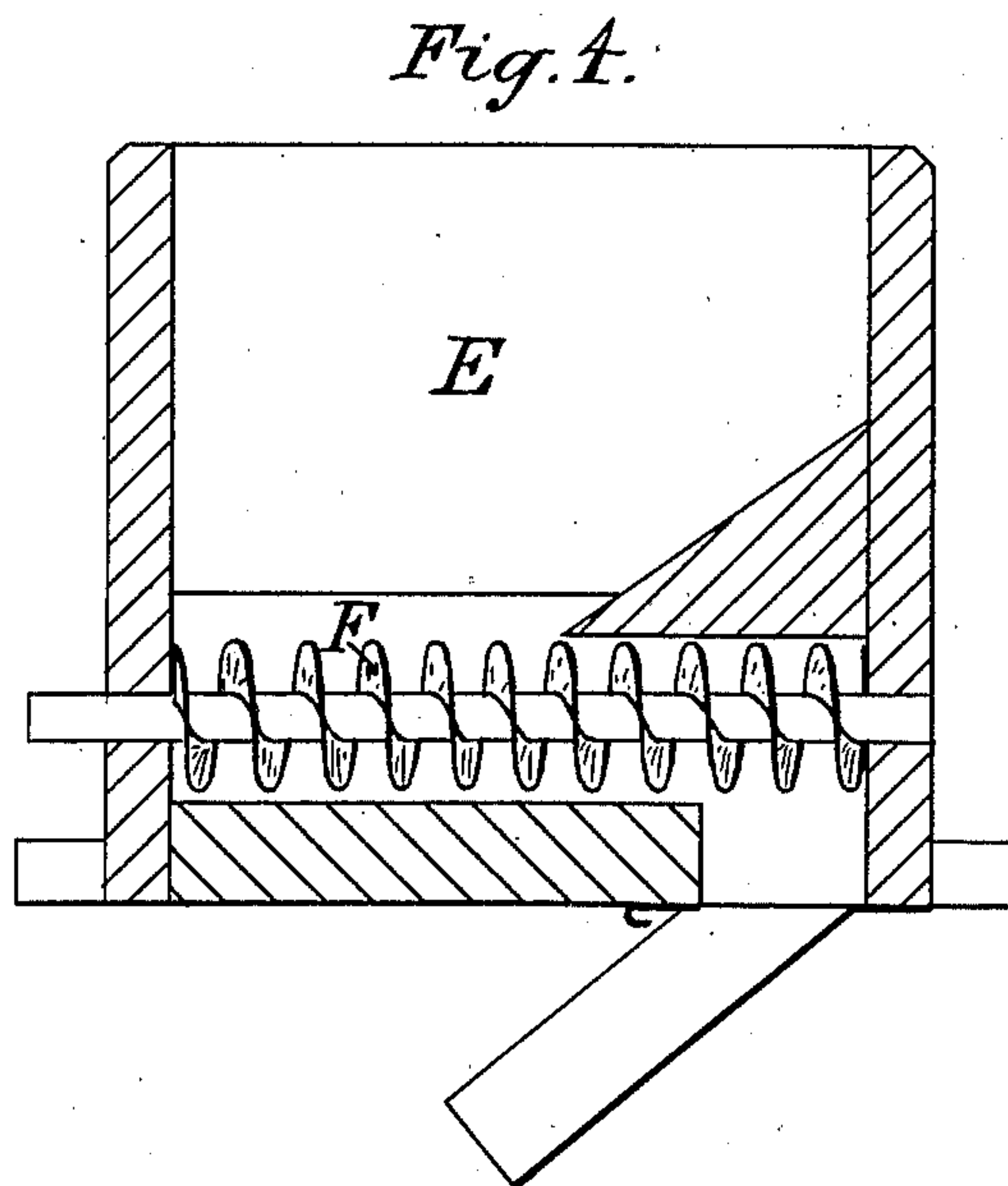
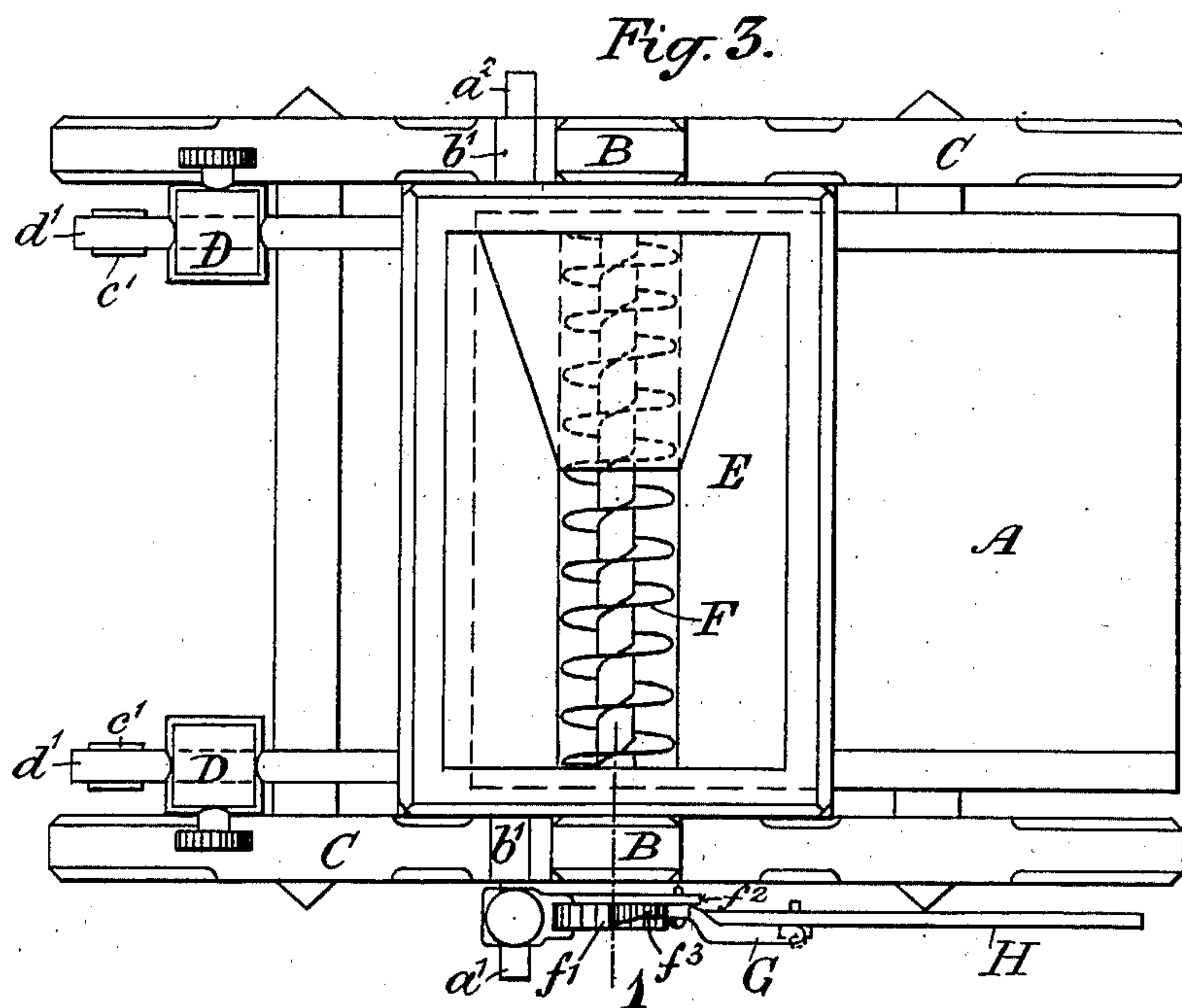
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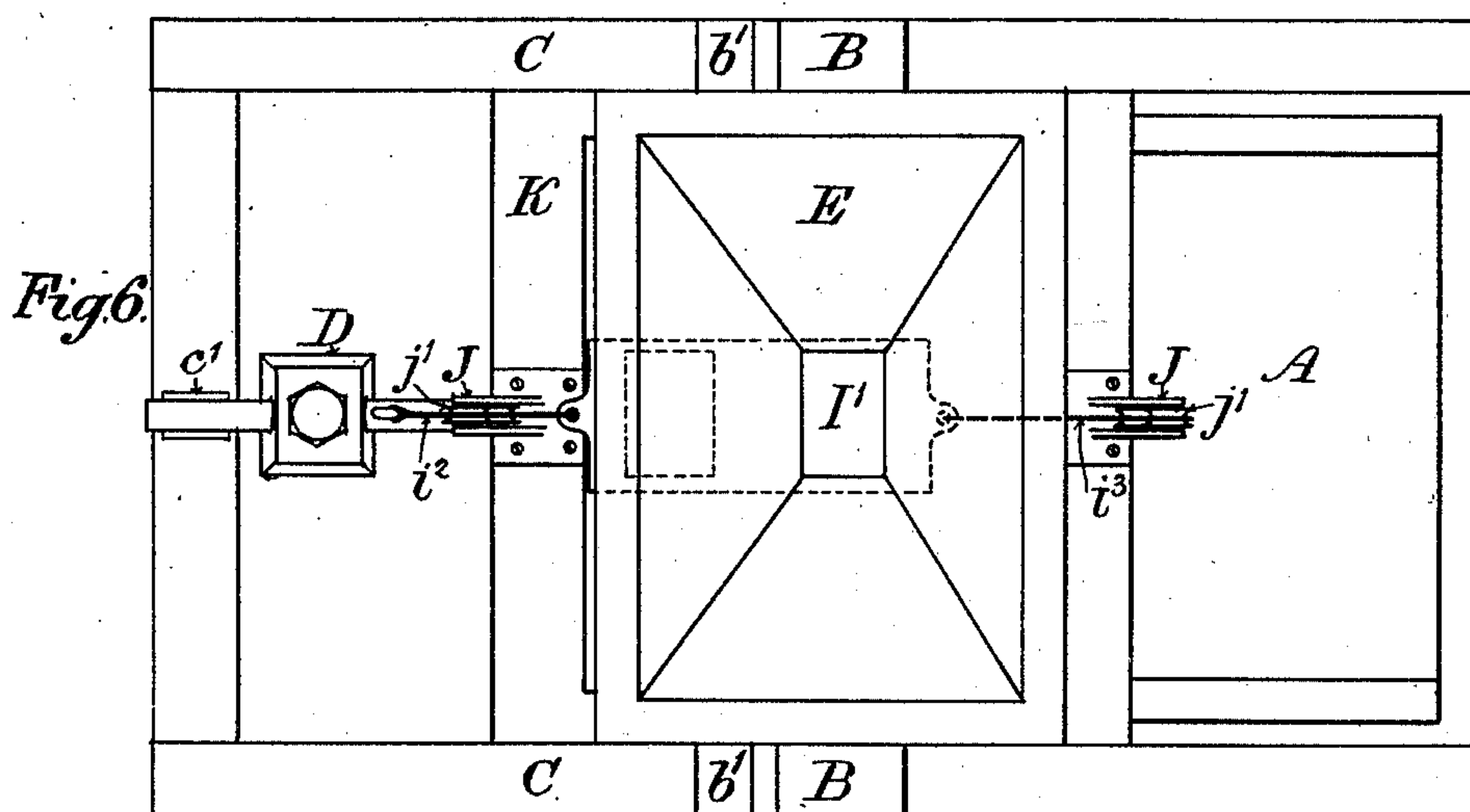
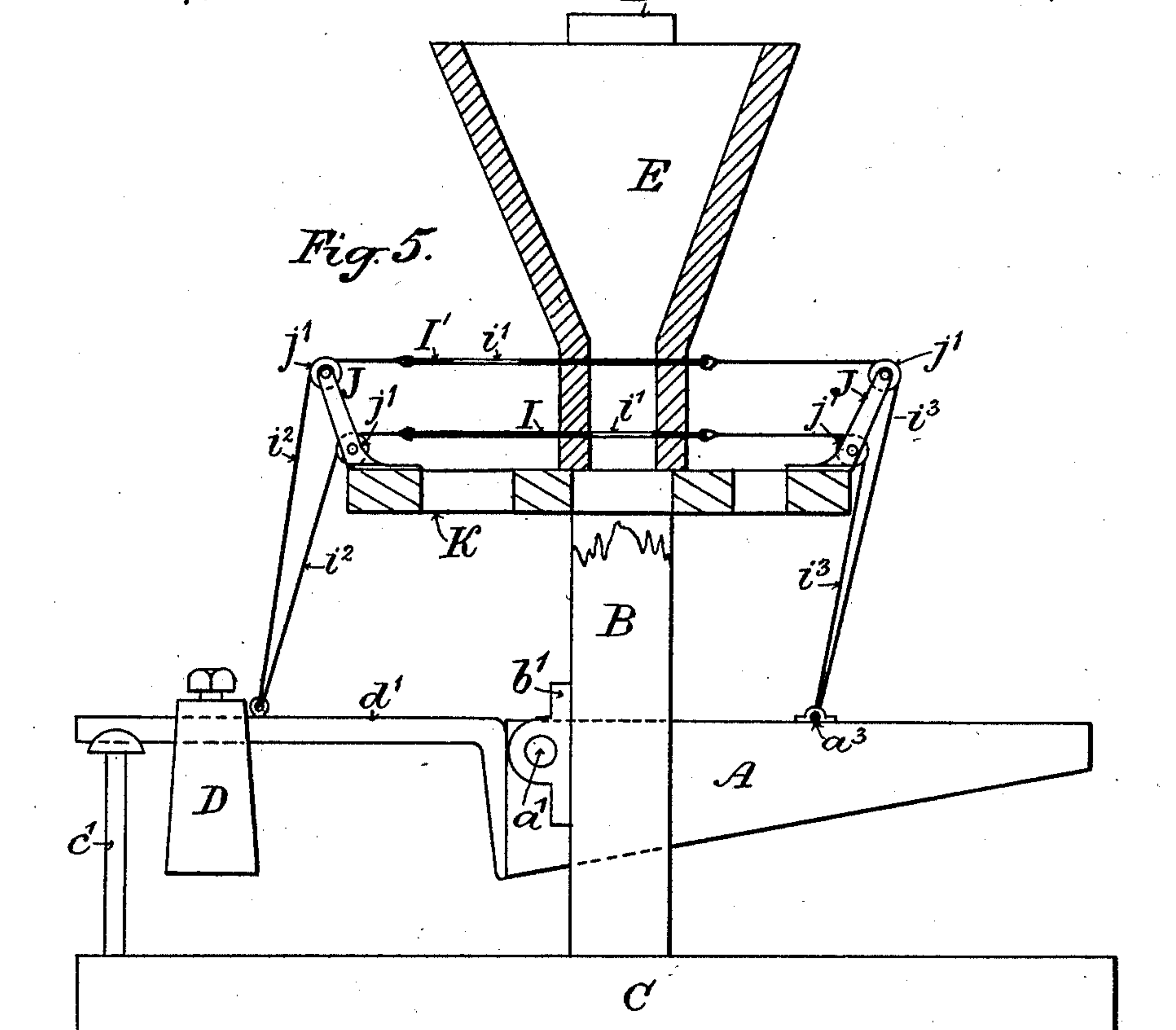
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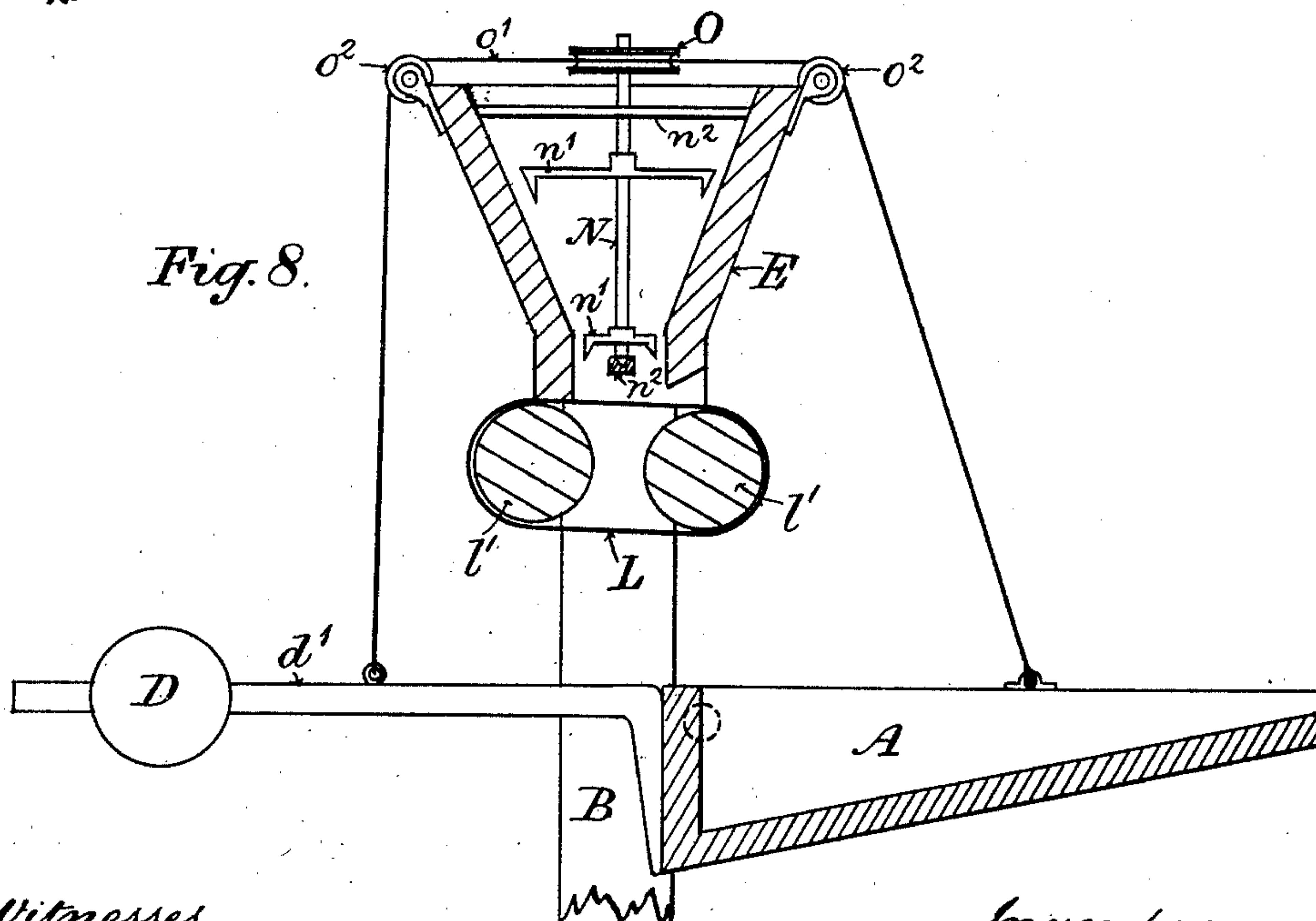
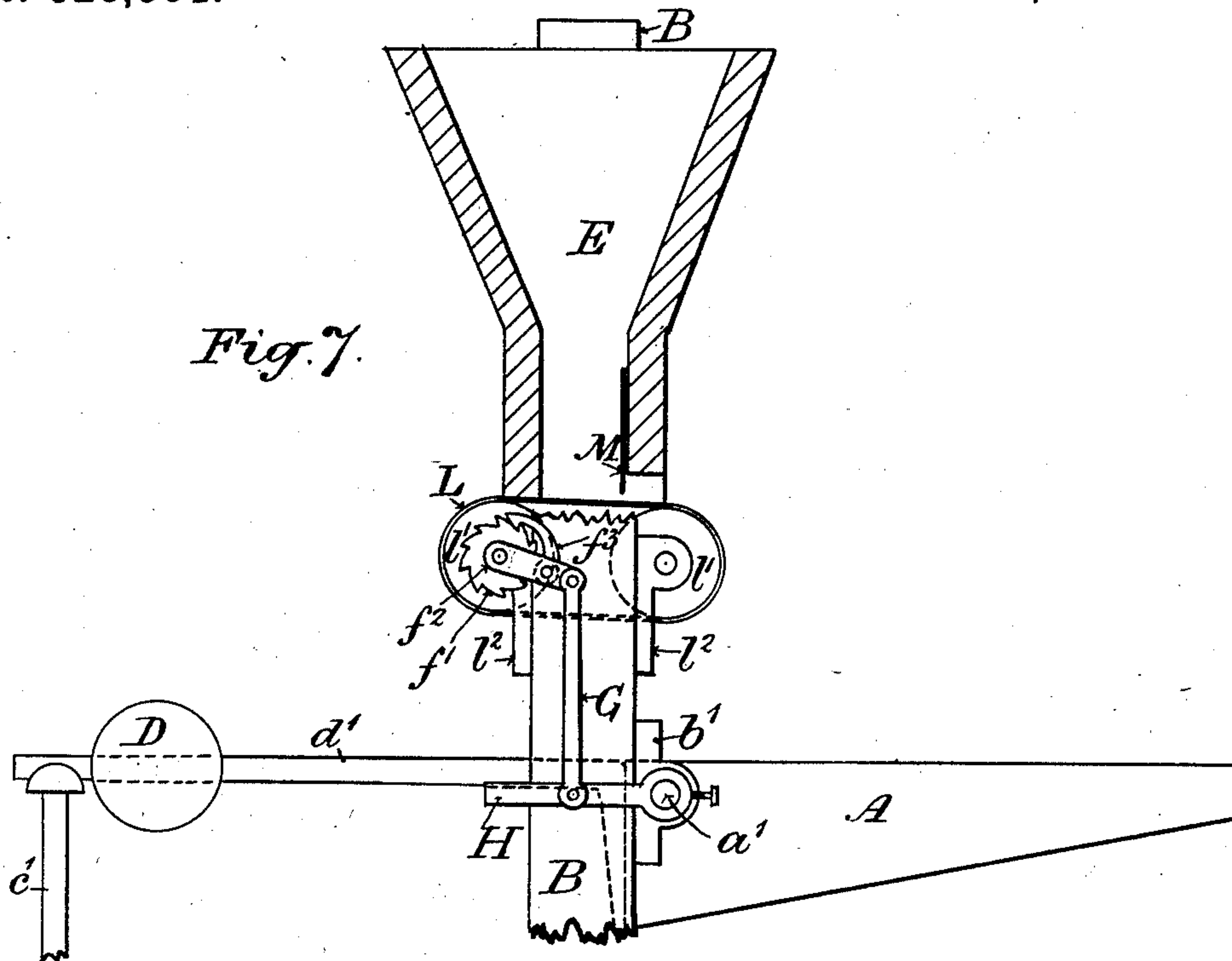
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# APPARATUS FOR THE TREATMENT OF SEWAGE.

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*Fig.*  
*10.*

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# UNITED STATES PATENT OFFICE.

SAMUEL KILPIN PAGE, OF AYLESBURY, COUNTY OF BUCKINGHAM, CHARLES EDWARD ROBINSON, OF SCARBOROUGH, COUNTY OF YORK, AND WILLIAM STEVENS, OF NEW BRIDGE STREET, COUNTY OF MIDDLESEX, ENGLAND.

## APPARATUS FOR THE TREATMENT OF SEWAGE.

SPECIFICATION forming part of Letters Patent No. 328,334, dated October 13, 1885.

Application filed November 6, 1884. Serial No. 147,293. (No model.) Patented in England May 3, 1884, No. 7,198.

*To all whom it may concern:*

Be it known that we, SAMUEL KILPIN PAGE, of Aylesbury, in the county of Buckingham, England, CHARLES EDWARD ROBINSON, of Scarborough, in the county of York, England, and WILLIAM STEVENS, of New Bridge Street, in the county of Middlesex, England, subjects of the Queen of Great Britain, have invented Improvements in Apparatus for use in the Treatment of Sewage, and in other operations in which solid matter is required to be added to or mixed with fluid matter in certain relative proportions, (for which we have made application for Letters Patent in Great Britain, No 7,198, dated May 3, 1884,) of which the following is a specification.

Our invention consists of the improvements hereinafter described in apparatus for use in the chemical treatment of sewage by the addition thereto or mixture therewith of solid matter in powder or in a moderately-fine state of division, and for use in other operations in which solid matter in a like state is required to be added to or mixed with fluid matter in certain relative proportions; and the object of our said invention is to cause the flow of the sewage or other fluid to which the solid matter is to be added, or with which it is to be mixed, to actuate apparatus by which the latter is supplied or by which its supply is controlled. The mixture of the said matters, or the addition of the one to the other, is thus effected automatically.

According to our said invention we mount a vessel of suitable form on pivots or trunnions in such a position relatively to the mouth of a pipe or conduit whence the fluid issues that the fluid so issuing shall pass into the said vessel; and we so arrange or counterbalance the said vessel that when it has received a certain quantity of fluid it will turn on its pivots or trunnions and discharge the fluid it has received and return to its original position, ready to receive another charge of the fluid. Above the said vessel we mount a hopper, in which the solid matter to be mixed with or added to the fluid is placed, and in the lower part of the said hopper we arrange mechanism by

which the discharge or passage of the solid matter therefrom is effected, or regulated or controlled, which mechanism is connected with the tilting vessel, and is actuated by the motion thereof.

We will describe our invention with reference to the accompanying drawings. The same letters and figures of reference indicate the same parts in each of the figures of the said drawings.

Figures 1 and 2 are elevations taken at right angles to each other, and Fig. 3 is a plan of apparatus constructed according to our invention. Fig. 4 is a separate view of part of the said apparatus, hereinafter referred to.

A is the tilting vessel, mounted on pivots or trunnions  $a' a^2$ , working in bearings  $b' b'$ , carried by uprights B B, supported by a base or frame, C.

D D are weights adjustably mounted on arms or levers  $d' d'$ , secured to the said vessel A.  $c' c'$  are supports on which the free ends of the said levers rest when the said vessel is in the position shown in the drawings, which is its normal position.

E is the hopper, supported above the vessel A by the uprights B B.

The mechanism by which the discharge of the matter contained in the hopper is effected, or by which the passage of the said matter is regulated or controlled, consists of a screw, F, the shaft or axis of which passes through the sides of the hopper and projects therefrom at one end, as shown in Fig. 4, which is a section of the hopper taken on the line 1, Fig. 3. The said shaft has affixed to its projecting end a ratchet-wheel,  $f'$ , and has a lever,  $f^2$ , mounted loosely on it, which lever carries a pawl,  $f^3$ , which engages with the teeth of the ratchet-wheel  $f'$ . The said lever  $f^2$  is jointed at  $f^4$  to a rod, G, which is also jointed to a lever, H, which is secured to the trunnion  $a'$  of the vessel A.

The method of using the apparatus hereinbefore described and its action are as follows:

The apparatus being so arranged relatively to the conduit conveying the fluid to be treated that the said fluid will pass into the vessel A,



the hopper E is charged with the solid matter to be added to or mixed with the fluid, and the weights D D are so adjusted on the levers  $d' d'$  as to admit of the vessel A tilting and discharging its contents, when filled or nearly filled with the fluid to be treated, which is then allowed to pass into the said vessel A. When the quantity of the fluid which has been passed into the said vessel is sufficient to overbalance it, it turns on its pivots or trunnions and draws down the lever  $f^2$  and pawl  $f^3$ , as indicated in dotted lines in Fig. 2, and when emptied returns to its normal position, its return causing a portion of the matter contained in the hopper E to be discharged into it by the action of the screw F, which is partly rotated on the return of the said vessel by the engagement of the pawl  $f^3$  with the teeth of the ratchet-wheel  $f'$ . The quantity of matter discharged from the hopper E at each action of the apparatus may be increased or decreased by connecting the rod G to the lever H farther from or nearer to the axis of the latter.

Instead of mounting a screw in the hopper for regulating the passage of the matter therefrom, we in some cases arrange slides one above the other in the lower part of the hopper, the said slides having openings formed in them, and being so connected to the tilting vessel as to be actuated as required by the motion of the said vessel. This arrangement is illustrated in elevation, partly in section, in Fig. 5 of the accompanying drawings, and in plan in Fig. 6. I I' are the slides, which have openings  $i' i'$  formed in them, and are connected by cords  $i^2 i^2$  to the lever  $d'$ , carrying the weight D, and by cords  $i^3 i^3$  to a rod,  $a^3$ , secured at its ends to the sides of the vessel A, the said cords passing over pulleys  $j' j'$ , working in bearings J J, secured to a frame K, supported by the uprights B B. This arrangement acts as follows: When the vessel A descends to discharge its contents, the space between the two slides is closed by the slide I, and the opening in the slide I' is brought within the mouth of the hopper, a portion of the matter contained in the hopper being thus allowed to descend into the said space. On the vessel A returning to the position shown in Fig. 5 the slides are caused to return to the position shown in the said figure, and the portion of matter below the slide I' passes through the opening  $i'$  in the slide I and falls into the vessel A. The quantity of matter discharged from the hopper at each action of the apparatus may be increased or decreased by increasing or decreasing the capacity of the lower part of the hopper between the two slides.

In cases where the matter with which the hopper is charged is of such a nature as to be liable to impede the motion of the slides  $i' i'$  to such an extent as to prevent the vessel A from tilting and discharging its contents when filled we allow sufficient slack in the cords  $i^3 i^3$  to admit of the vessel A starting and ac-

quiring sufficient momentum to overcome the resistance of the said slides before the said cords are drawn tight. The slides are thus started with a jerk and the said resistance is overcome, the force with which the slides are acted on when started being in proportion to the momentum acquired by the vessel A, which momentum is greater or less, according to the amount of slack in the said cords.

In Fig. 7 of the accompanying drawings another arrangement for effecting the discharge from the hopper of the matter contained therein is shown, the said arrangement consisting of an endless band, L, mounted below the mouth of the hopper E on rollers  $l' l'$ , the axes of which work in bearings  $l'' l''$  affixed to the uprights B B, to which band the required motion is imparted by means of mechanism similar to that hereinbefore described with reference to Figs. 1, 2, and 3 of the accompanying drawings for working the screw F. M is a sliding plate arranged within the hopper, by raising and lowering which plate the quantity of matter passing from the hopper at each action of the apparatus may be increased or decreased, as required.

In cases where the matter with which the hopper is charged is of such a nature as to be liable to "bridge" therein, or not to descend when the discharging mechanism is actuated, we mount or arrange in the hopper a stirrer consisting of a rotatory shaft carrying arms, which stirrer we so connect to the tilting vessel that at each motion of the latter the said shaft is rotated or partly rotated. This arrangement is illustrated in Fig. 8 of the accompanying drawings, in which figure N is the rotatory shaft, and  $n' n'$  are the arms carried thereby. The said shaft is supported by bars  $n^2 n^2$  within the hopper, and carries at its upper end a pulley, O, around which passes a cord,  $o'$ , which also passes over pulleys  $o^2 o^2$ , mounted in frames secured to the hopper, and is secured at its ends to the vessel A and counterbalance-lever  $d'$ .

Instead of using a stirrer, we in some cases so mount the hopper that it may be capable of a vibratory motion, and we mount a hammer on or in connection with the vessel A in such a position relatively to the said hopper that at each action of the apparatus the hopper is shaken or jogged sufficiently to disturb its contents and insure their descent as required. This arrangement is illustrated in vertical section in Fig. 9, and in plan in Fig. 10, of the accompanying drawings, in which figures P P are rods or springs secured at their lower ends to the uprights B B, and at their upper ends to the hopper, which is supported entirely by the said rods or springs P P. Q is an arm affixed to the lower part of the hopper, and R is a hammer mounted on a spring-stem,  $r'$ , secured to the side of the vessel A. By this arrangement the hopper is shaken at each action of the apparatus, the hammer R striking the arm Q each time the vessel A rises after discharging its contents. In order to limit the



extent of vibration of the hopper, grooves  $b^2 b^2$  are formed in the uprights B B, in which grooves the springs P P work, the said springs being formed as shown in Fig. 11.

5 If found necessary, both the means hereinbefore described for insuring the descent of the contents of the hopper may be used conjointly.

Having now described the nature of our invention and the manner in which the same is  
10 to be performed, we wish it to be understood that we claim as our invention, in an apparatus for use in the treatment of sewage, and in other operations in which solid matter is required to be added to or mixed with fluid matter in cer-  
15 tain relative proportions, the following:

1. The combination of the tilting vessel or receptacle, and the hopper having a discharging-screw, with the ratchet-and-pawl mechanism, and the connecting arm and lever for actu-

ating said discharging-screw by the movement 20 of the tilting vessel, substantially as described.

2. The combination of a feed-hopper, an automatically-operating tilting receiving-vessel having a connection therewith to automatic- 25 ally feed material to the receiver, an automatic agitator to the hopper, and a counterbalance to the receiver, substantially as described.

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CHARLES EDWARD ROBINSON. [L. S.]

WILLIAM STEVENS. [L. S.]

Witnesses to the signatures of the above-named SAMUEL KILPIN PAGE, CHARLES ED-  
WARD ROBINSON, and WILLIAM STEVENS:

PERCY LEOPOLD WILLIAMS OKEY,

JOHN ALFRED DONNISON,

*Clerks to Mr. Alfred Donnison, 71 Cornhill, London, Notary Public.*