

(No Model.)

2 Sheets—Sheet 1.

G. BEHRNS.
DUST COLLECTOR.

No. 357,060.

Patented Feb. 1, 1887.

Fig. 1.

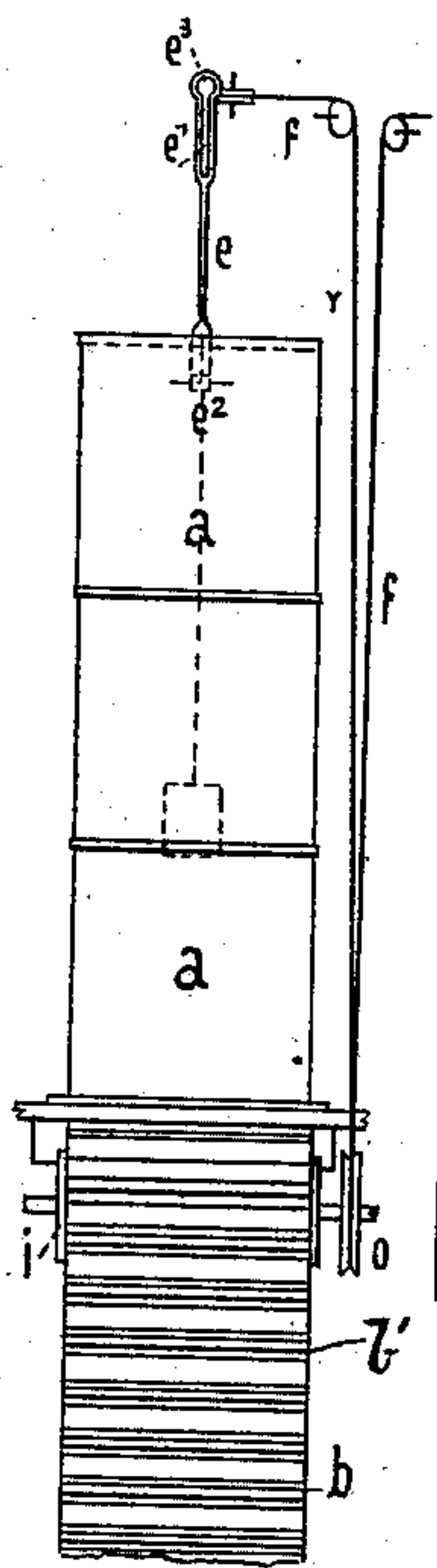


Fig. 3.

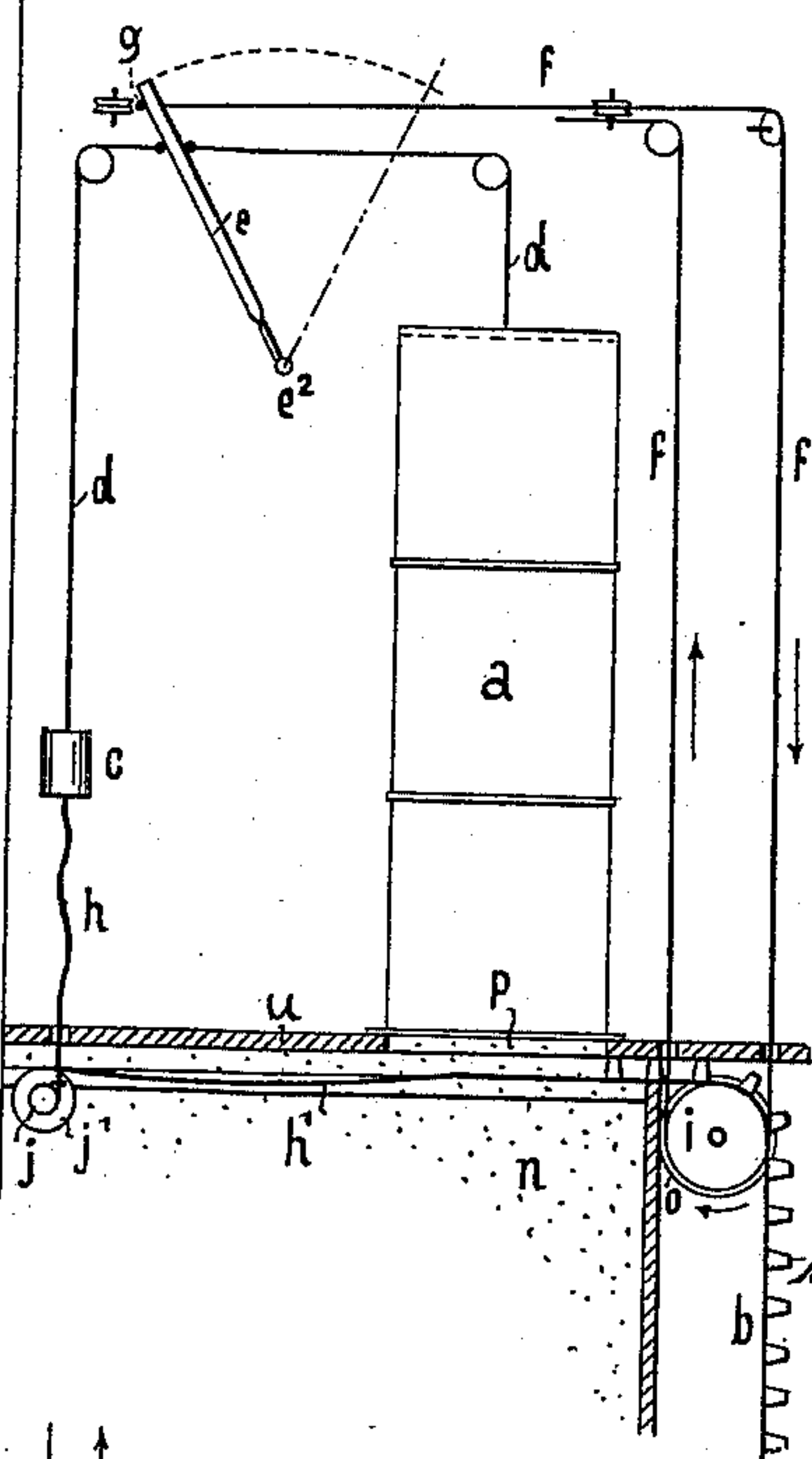


Fig. 4.

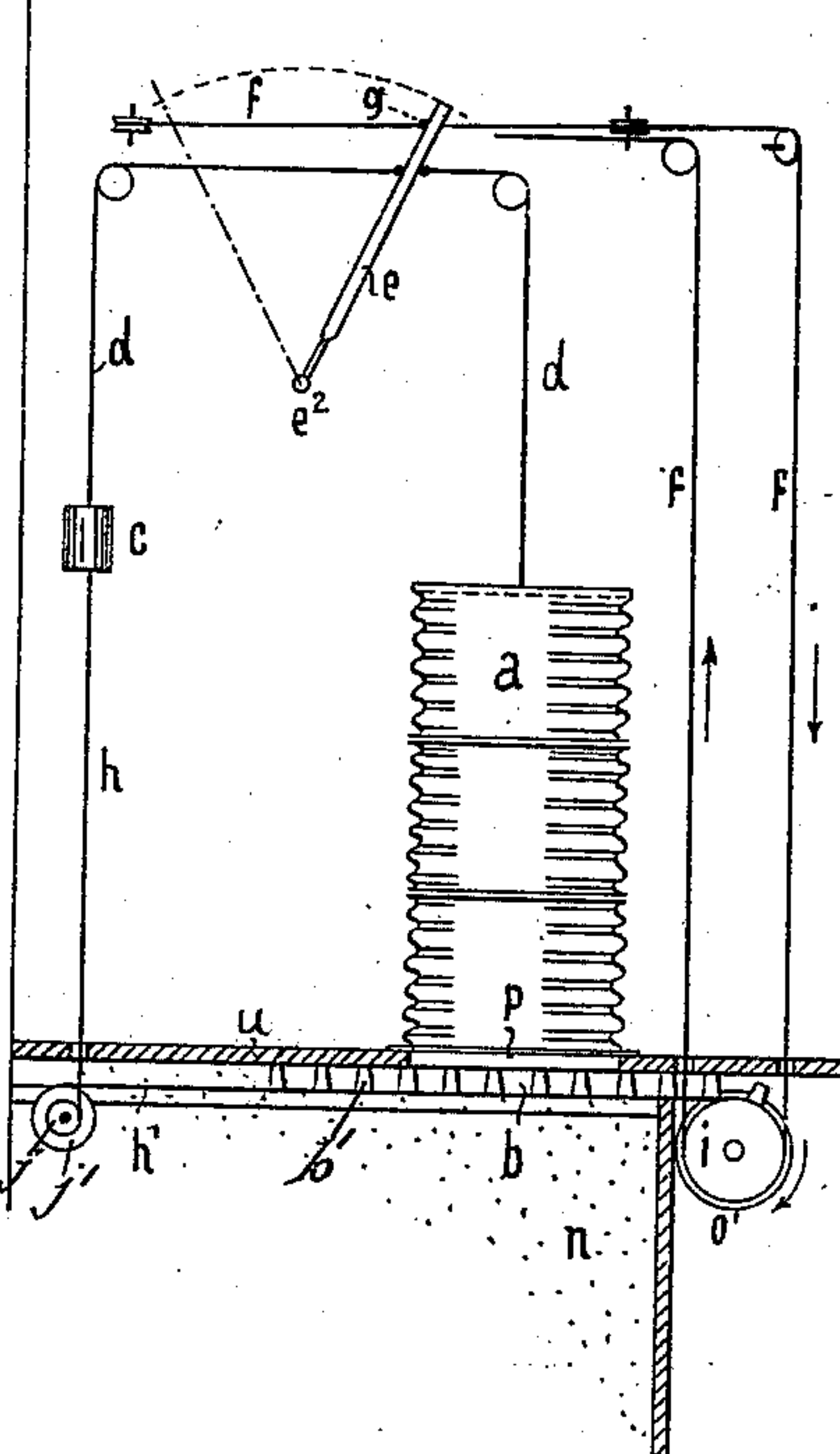


Fig. 2.

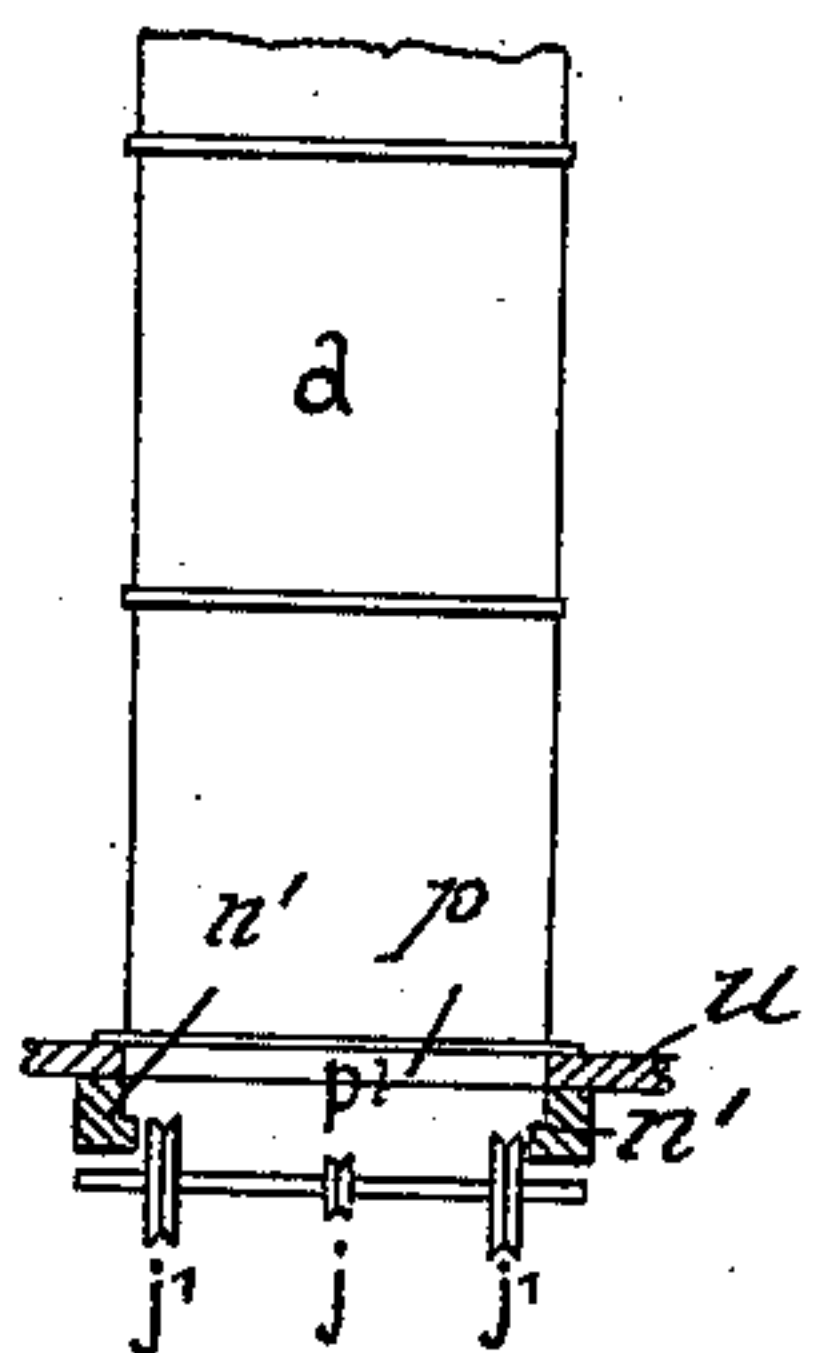


Fig. 5.

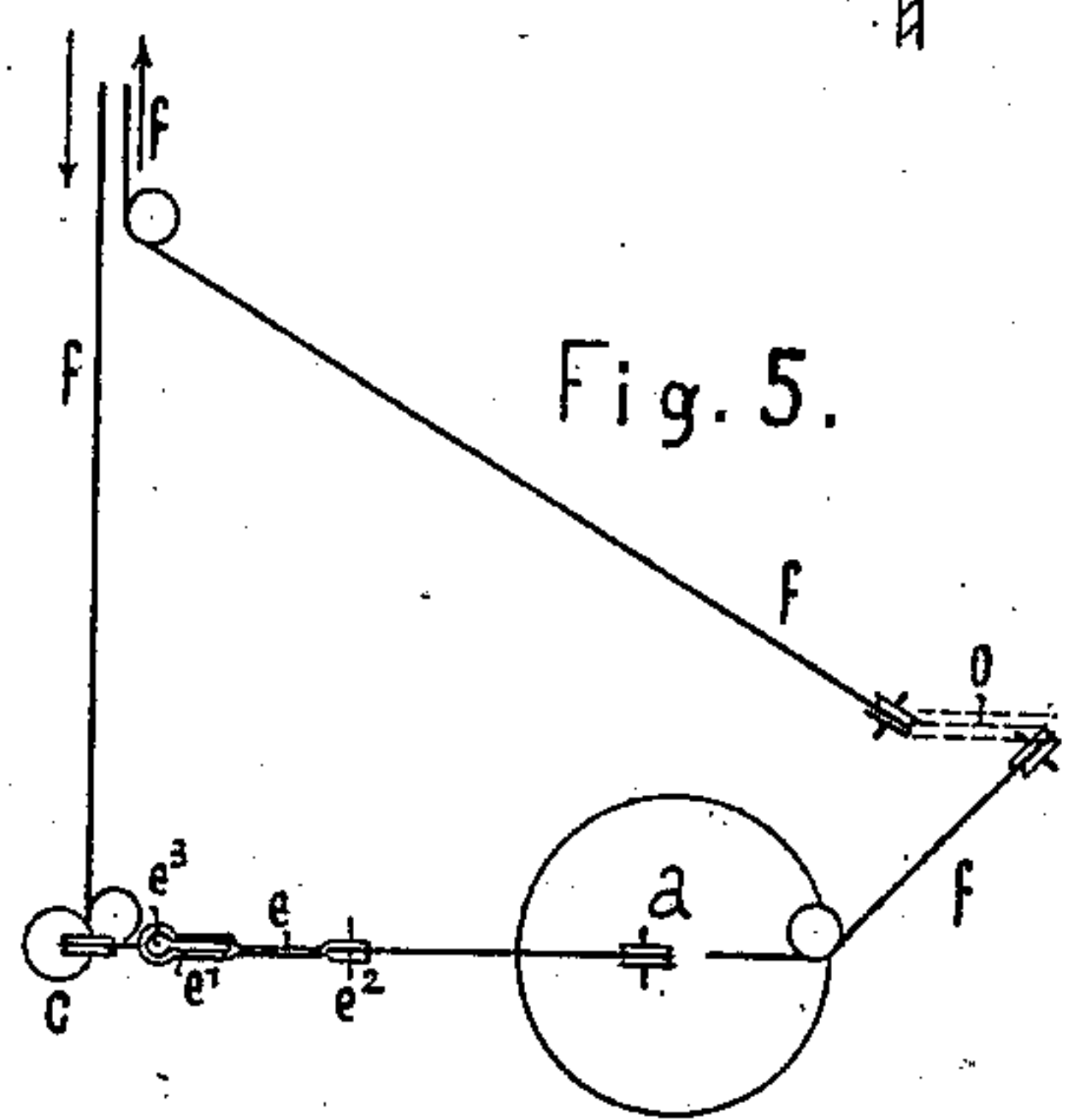
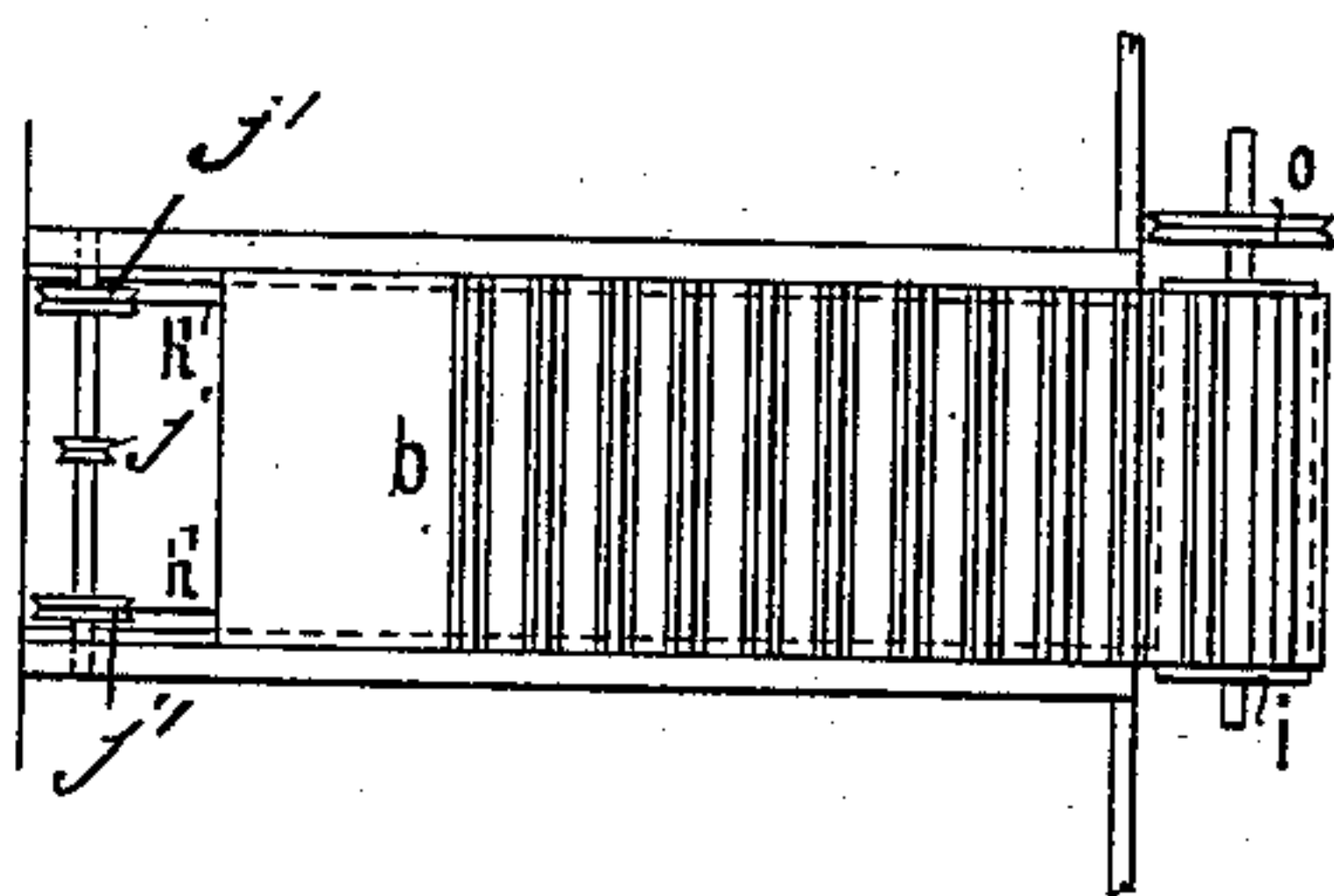


Fig. 6.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 7.

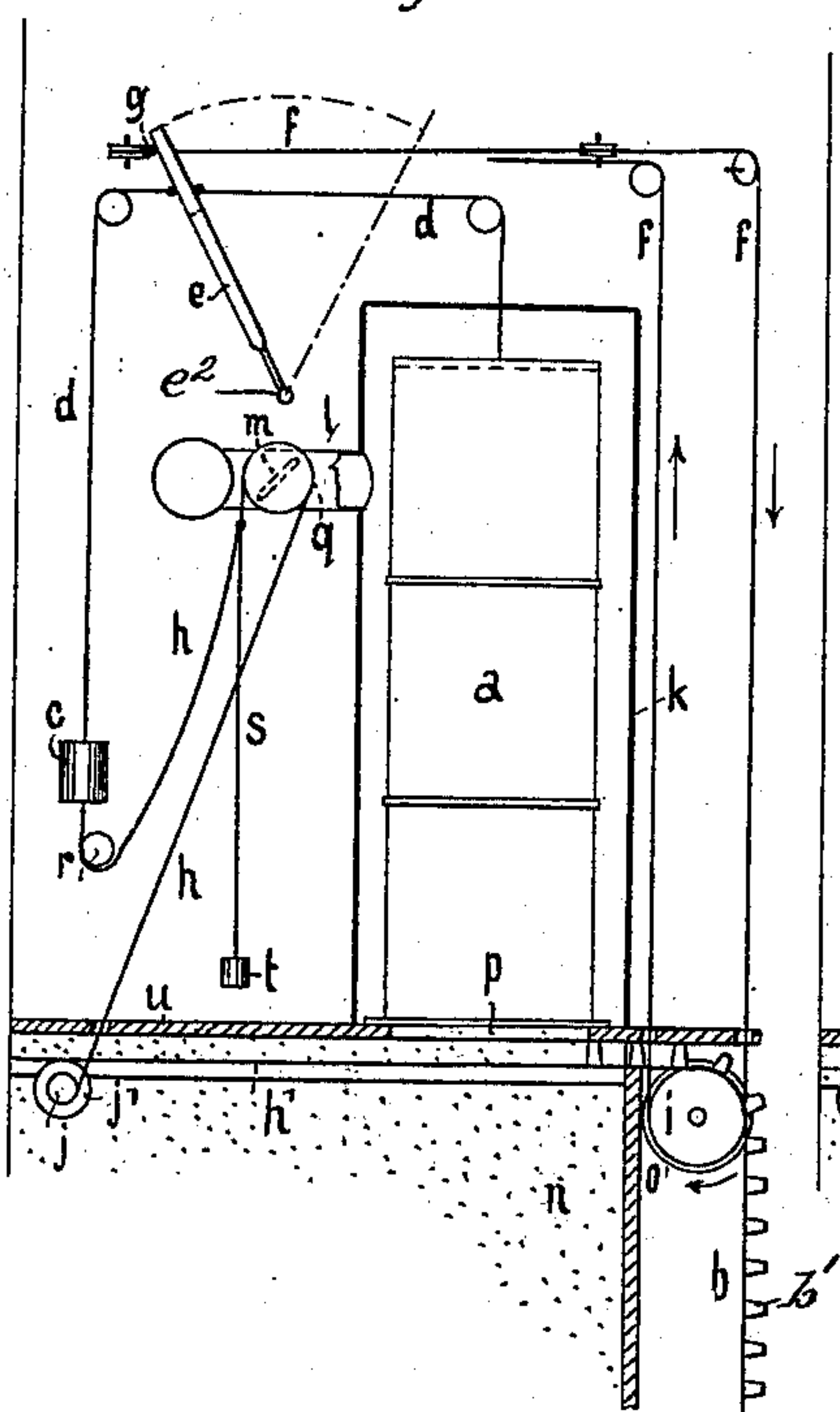


Fig. 8.

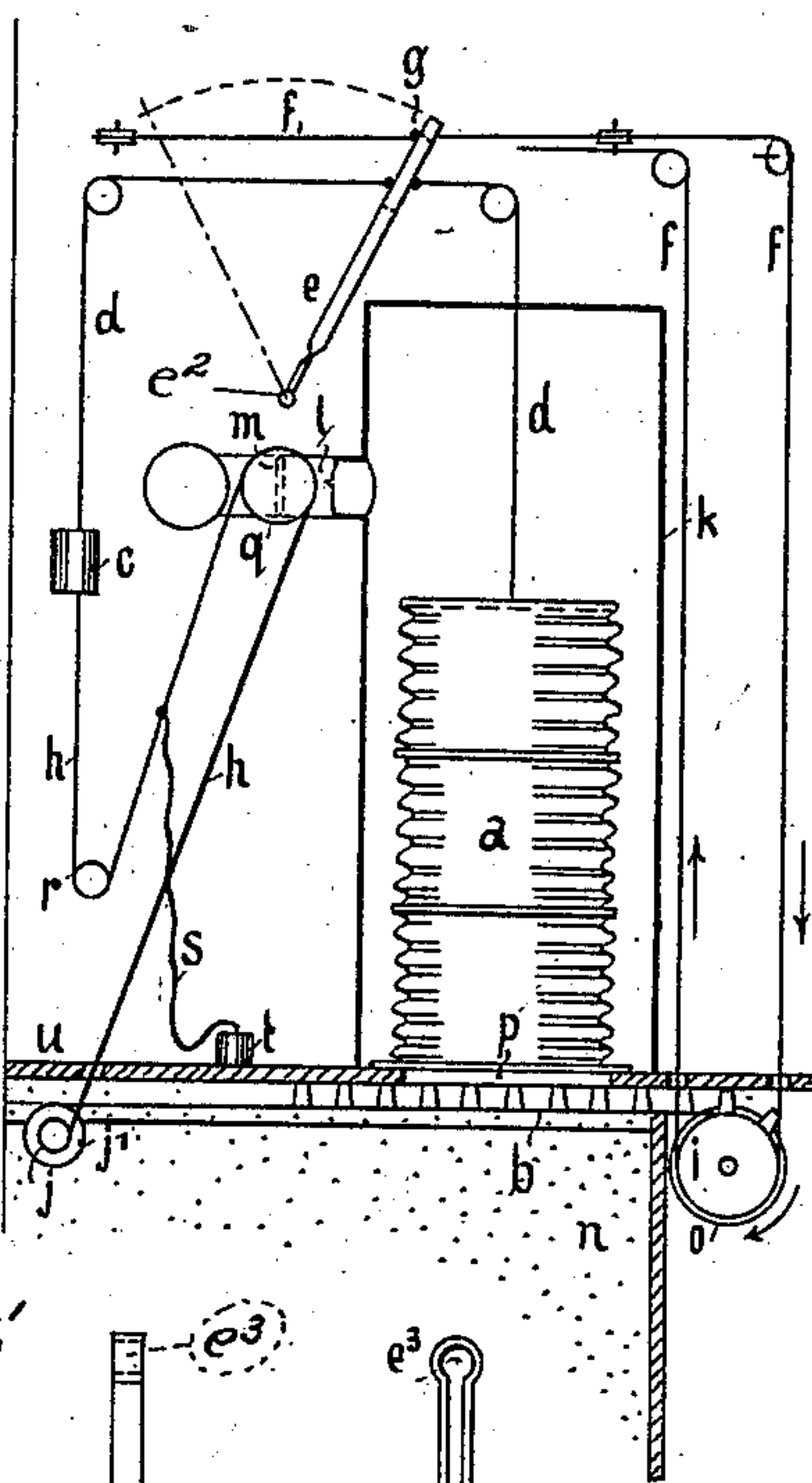


Fig. 10.

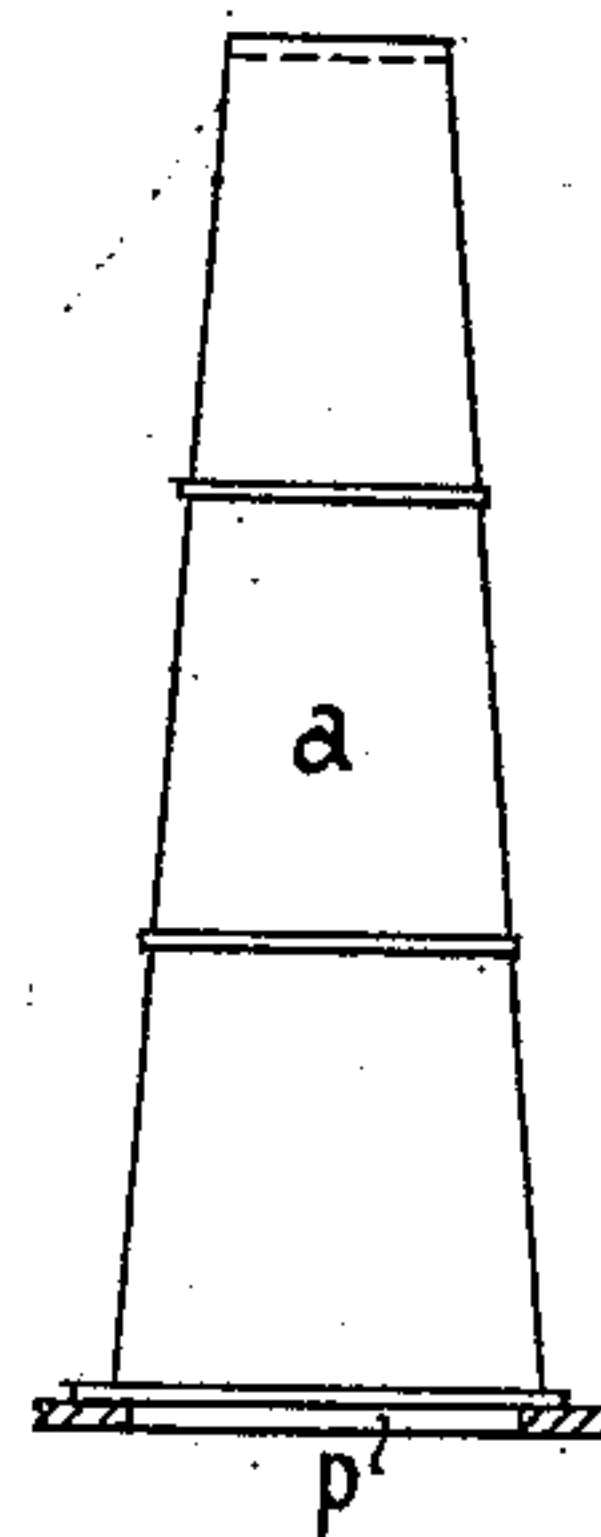


Fig. 9.

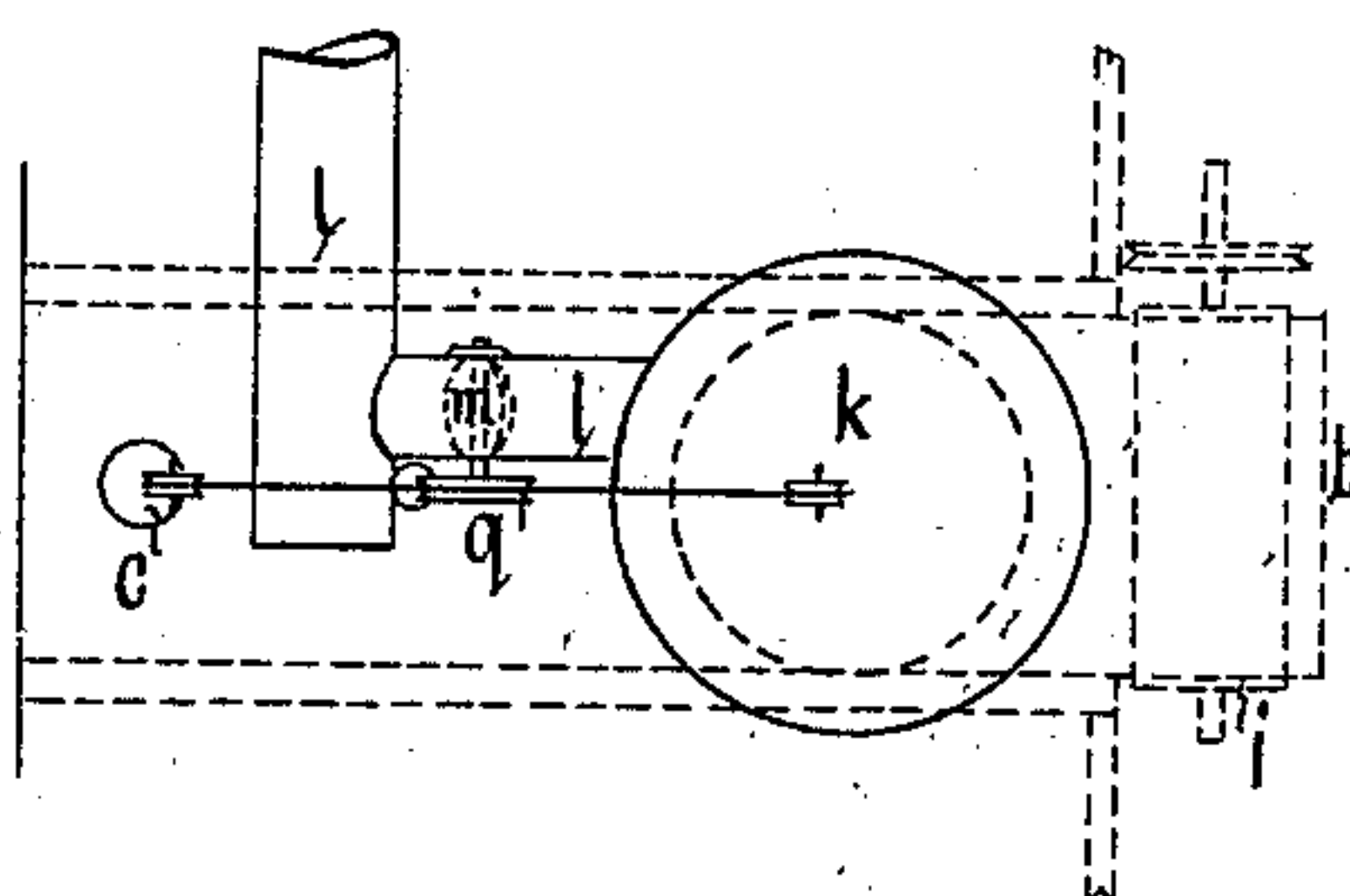
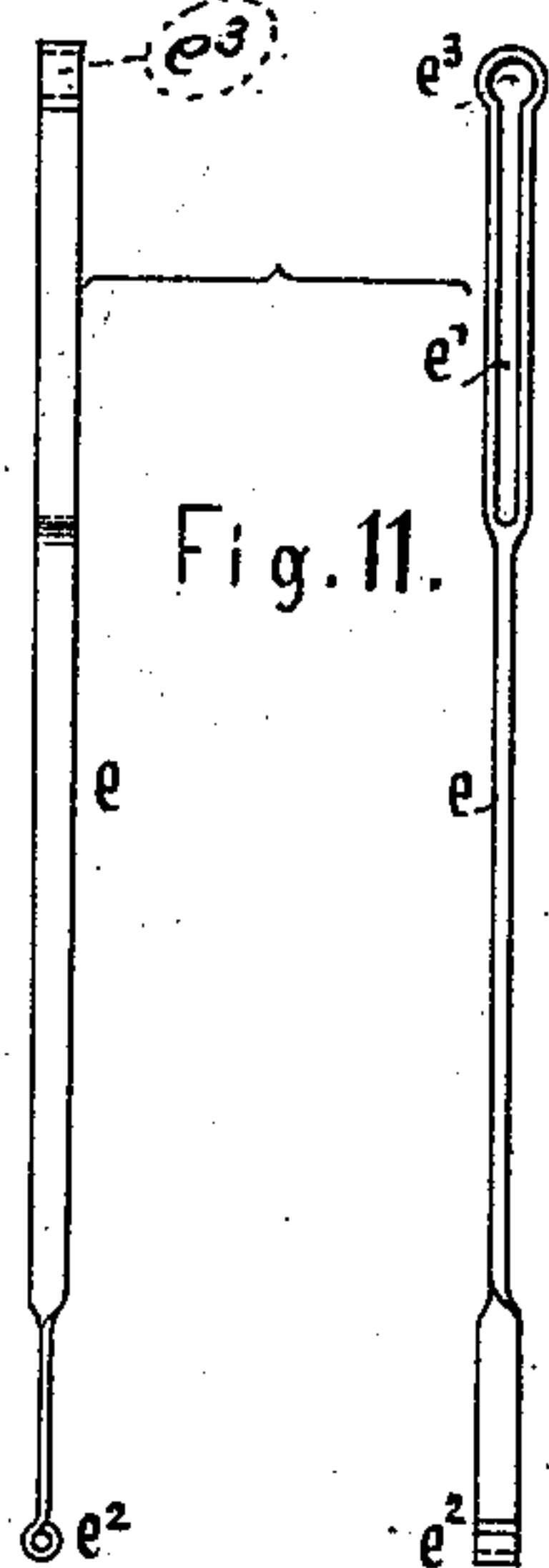


Fig. 11.



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UNITED STATES PATENT OFFICE.

GUSTAV BEHRNS, OF LUBECK, GERMANY.

DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 357,060, dated February 1, 1887.

Application filed March 10, 1886. Serial No. 194,734. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV BEHRNS, a citizen of the free State of Lubeck, and residing in the city of Lubeck, German Empire, have
5 invented certain new and useful Improvements in Dust-Collectors, whereof the following is a specification.

My invention relates to dust-collectors for separating dust, or, in general, finely comminuted solid matter, from air, steam, water, or other fluids, as hereinafter fully described; and it consists in features of novelty, which are more particularly pointed out in the claims.

A dust-collector constructed according to my
15 invention, and designed to be used especially for the filtration of dust-laden air, is represented on the annexed two sheets of drawings, in which—

Figures 1 to 6 show a form of dust-collector
20 for separating dust, &c., from a current of air or other fluid introduced by means of a blast; and Figs. 7 to 9 show another form of dust-collector for separating dust, &c., from a current of air introduced by suction. Fig. 1 is a front elevation of a part of the dust-collector of the former type. Fig. 2 is a partly broken
25 and a sectional elevation showing details, hereinafter fully described. Figs. 3 and 4 are side elevations of the complete machine, there being shown in different positions in the two figures the movable parts. Fig. 5 is a top view of that portion of the machine which is situated above the floor, and Fig. 6 a like view of the portion which is situated below the floor.
30 Figs. 7 and 8 are side elevations of a dust-collector of the second type, the casing being shown in section and the movable parts in different positions, corresponding to those of Figs. 3 and 4. Fig. 9 is a top view of the same. Fig. 10 shows a filtering-bag of a form differing from that shown in the preceding figures. Fig. 11 shows in detail a lever, hereinafter described.

The filtering-bag *a*, preferably made either
45 in the form of a cylinder, Figs. 1 to 9, or of a cone, Fig. 10, and closed at the top by a disk of wood, is fixed with its lower border to the edge of an aperture, *p*, in the stationary floor *u*, forming the top of the chamber *n*, through which the dust-laden air, &c., passes
50 on its way to the bag.

The air or other fluid to be purified is made

to travel through the chamber *n*, filtering-bag *a*, and other parts of the machine by means of a fan or pump, which produces a blast. The
55 bag is maintained in an upright and expanded state by means of a rope, *d*, running over two guiding-sheaves, and a weight, *c*. The aperture *p* is closed by a slide, *b*, consisting of a sheet of cloth or other flexible material, with
60 transverse ribs *b'*, supported upon guideways *n'*, Fig. 2, close to the under side of the floor *u*, upon which it may be moved in and out of the chamber through an aperture in the front wall. This slide is connected by two ropes, *h'*,
65 to sheaves *j'*, fixed to a shaft carrying another sheave, *j*, to which is connected one end of a rope, *h*, the other end of which is connected to a weight, *c*.

i is a roller, placed outside of the compartment *n* and rotated continuously in the direction of the arrow shown in the drawings by means of an endless rope, *f*, which passes over a pulley, *o*, fixed thereto.

The rope *d* is passed through the slit *e'*
75 (see Fig. 11) of a lever, *e*, centered at *e'*, and is provided on either side of the lever with a knot, or otherwise fastened to the same, so that when the lever is moved to one side the weight *c* will be lifted and the bag will collapse by its
80 own weight, as shown by Fig. 4, whereas when the lever is released the weight *c* will return the same to the position shown in Fig. 3, and simultaneously draw up and expand the bag.

The movement of the lever *e* into the position shown in Fig. 4 is brought about by the
85 endless rope *f*, which is also passed through the slit *e'* and maintained in continuous motion by any suitable or desired means. The rope *f* acts on the lever by means of a knot
90 or a driver, *g*, fixed thereto, and is also made to keep the roller *i* constantly in slow motion, as already stated, suitable guiding-sheaves being provided according to relative location of the various parts.

When, after the filtering operation has been going on for some time, the driver *g* comes in contact with the lever *e*, it pushes the same into the position shown in Fig. 4, thereby raising the weight *c* and allowing the bag to collapse by its own weight to the extent permitted by the slack of the rope. Simultaneously a pull is thereby exercised on the part of the rope *d* which in the drawings is on the left-
95
100

hand side of the lever *e*, and this pull, in being transmitted by the rope *h* and the sheaves *j* and *j'* to the ropes *h'*, causes the slide *b* to move to the left and to close the aperture *p* beneath the bag *a*. While the slide is thus moved, it slips upon the roller *i* in the direction contrary to the rotation of the same. During the movement of the lever *e* by the driver *g* the said driver slides along the lever until it meets with an enlargement, *e'*, of the slit *e'*, whereupon it slips through the same and releases the lever. The weight *c* then quickly draws up and expands the bag, thereby producing an aspiration of fluid from the outside to the inside of the bag, and consequently a back-current through the pores of the same. This action is due to the fact that the mouth of the bag is closed by the slide *b*. Moreover, the weight, being suddenly stopped in its descent by the bag and the rope *d*, causes the bag to be shaken. By the combined action of this shaking and of the back-draft the dust adhering to the bag is detached and caused to drop on the slide *b*.

Upon the descent of the weight *c* the rope *h* becomes slack, which permits the continuously-rotating roller *i* by friction to draw the slide along in the direction of its rotation (*i. e.*, to the right relatively to the drawings) until the ropes *h* and *h'* have become taut again and the opening *p* unobstructed. The slide then stops, while the roller continues to rotate under the same. (Fig. 3 shows the position of the slide a little before the end of its movement by the roller *i*, so that the ropes *h* and *h'* are still somewhat slack.) By this movement of the slide the bag is opened again for the admission of dust-laden air or fluid, while the dust lying on the slide drops off the same in the measure as the slide, in passing over the roller *i*, bends by its weight and assumes the vertical position. The dust on leaving the slide may be collected in a suitable receptacle.

In order that the bag on being drawn up may be compressed as little as possible by the pressure of the external atmosphere, it is provided with several light hoops.

If the filtration is to be brought about by a current produced by suction, there has to be added to the described parts an impermeable casing, *k*, connected by a pipe, *l*, with a suction device. The communication between the casing and the suction device requires, however, always to be stopped during the period the filter is being cleaned, in order to bring the full pressure of the air or other liquid into operation on the bag from the outside to the inside. For this purpose the pipe *l* is provided with a throttle-valve, *m*, which is opened and closed by means of a sheave, *q*, fixed to the axle of the valve, and the rope *h* passed over the said sheave and a guiding-sheave, *r*, in combination with a rope, *s*, attached to the said rope *h* and carrying a weight, *t*. In Fig. 7 these parts are shown in the position they occupy shortly before the slide *b* is completely

drawn back to open the bag. The throttle-valve is not yet quite open, and the part of the rope *h* between the weight *c* and the point of attachment of the rope *s* is still slack; but the remaining part of rope *h* is held taut by rope *s* and by the pendent weight *t*, so that there is friction between the rope *h* and the sheave *q*, and that any subsequent pull exercised by the ropes *h'* on rope *h* will open the valve completely. By means of a stop (not shown) the valve is then prevented from turning further, whereas the rope *h*, if it should not have become taut upon its whole length at the same moment, will slide along upon the sheave until complete tautness will have been arrived at. If, now, the lever *e* is brought into the position of Fig. 8, the rope *h* operates to turn the valve *m* in contrary direction until it is checked in closing position by another stop. (Not shown.) The rope *h* then, during its further motion, again slides on the sheave *q*, the weight *t* settles on a fixed support, (in the present case on the floor *u*,) and the rope *s* becomes slack. If, thereupon, after the return of the lever *e* to the position of Fig. 7 and the consequent slackening of the rope *h*, the slide *b* has partly reopened the bag and taken up a portion of the slack of the rope *h*, the weight *t*, on being lifted by the rope *s*, causes tension in the latter and in the part of the rope *h* passing over the sheave *q*. By its subsequent motion the rope *h* then turns the sheave again in the direction in which it opens the valve *m*.

For the filtration of air containing watery vapor it is advisable to construct the casing *k* of a material which is a bad conductor of heat, for the purpose of preventing a condensation of the vapor inside of the same.

I claim as my invention—

1. The combination, with the air-chamber *n*, having the aperture *p*, and the bag *a*, having its lower open end secured around said aperture, of the weight *c*, the cord *d*, secured at its respective ends to said bag and weight, pulleys supporting said cord, the lever *e*, also connected with said cord, and means for moving said lever in the direction to elevate the weight and permit the bag to collapse, substantially as and for the purpose set forth.

2. The combination, with the air-chamber *n*, having the aperture *p*, and the bag *a*, having its lower open end secured around said aperture, of the weight *c*, the cord *d*, having its respective ends connected with said weight and the upper end of the bag, the pulleys supporting said cord, the lever *e*, engaged by said cord, and the endless moving cord *f*, having driver *g*, for engaging said lever at intervals, substantially as set forth.

3. The combination, with the air-chamber *n*, having the aperture *p*, and the bag *a*, having its lower open end secured around said aperture, of the weight *c*, the cord *d*, secured at its respective ends to said weight and the top of the bag, means for elevating the weight and permitting the bag to collapse, the slide *b*, for covering the aperture *p*, and connections be-

tween the weight *c* and slide *b* whereby the latter is drawn over the aperture *p* when the former is elevated, substantially as set forth.

4. The combination, with the chamber *n*, 5 having the aperture *p*, and the bag *a*, having its lower open end secured around said aperture, of the weight *c*, the cord *d*, connected at its respective ends to said weight and the upper end of the bag, the slide *b*, the shaft having 10 pulleys *j j'*, and the cords *h h'*, connecting the weight and slide with said pulleys, substantially as and for the purpose set forth.

5. The combination, with the chamber *n*, having the aperture *p*, and the bag *a*, having 15 its open lower end secured around said aperture, of the means for holding said bag normally in a distended condition and permitting it to collapse at intervals, the slide *b*, and connections between said bag and slide whereby 20 the latter is drawn over the aperture when the former is allowed to collapse, substantially as set forth.

6. The combination, with the chamber *n*, having the aperture *p*, and the collapsible bag 25 *a*, having its lower open end secured around said aperture, of the slide *b*, consisting of a flexible strip having transverse ribs *b'*, and the roller *i*, over which said strip bends, substantially as set forth.

30 7. The combination, with the chamber *n*, having the aperture *p*, and the bag *a*, having its open lower end secured around said aperture, of the weight *c*, the cord *d*, connected at its respective ends with said weight and the 35 top of the bag *a*, the lever *e*, engaged by said cord, the slide *b*, the roller *i*, on which said slide rests, having pulley *o*, the endless cord *f*, passing over said pulley and having the driver *g* for engaging the lever *e*, the shaft having 40 pulleys *j j'* secured thereto, and the cords *h h'*, connecting the weight *c* and slide *b*, all

constructed and arranged to operate substantially as and for the purposes set forth.

8. The combination, with the chamber *n*, having the aperture *p*, and the bag *a*, having 45 its lower open end secured around said aperture, of the casing *k*, inclosing said bag, means for holding the bag normally in distended condition and allowing it to collapse at intervals, the slide *b*, and the valve *m*, all constructed 50 and arranged to operate substantially as set forth.

9. The combination, with the chamber *n*, having the aperture *p*, the bag *a*, having its open end secured around said opening, and 55 means for holding said bag normally in distended condition and allowing it to collapse at intervals, of the casing *k*, inclosing said bag, the valve *m*, the slide *b*, and connections between said slide and the valve, substantially 60 as and for the purpose set forth.

10. The combination, with the chamber *n*, having the aperture *p*, and the bag *a*, having its open end secured around said aperture, of 65 the weight *c*, the cord *d*, connected at its respective ends to said weight and the top of the bag, means for raising said weight and permitting the bag to collapse, the slide *b*, the cords *h h'*, connecting said weight and slide, the valve *m*, the pulley *q*, secured to the shaft 70 of said valve, and the guide-pulley *r*, over which said cord *h* passes, the short cord *s*, connected to the cord *h*, and the weight *t*, all constructed and arranged to operate substantially as and for the purpose set forth. 75

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GUSTAV BEHRNS.

Witnesses:

W. A. L. BETH,
RUD. HILDEBRAND.