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J. J. KENNEDY.  
ORE CONCENTRATOR.  
APPLICATION FILED DEC. 10, 1904.

2 SHEETS—SHEET 1.

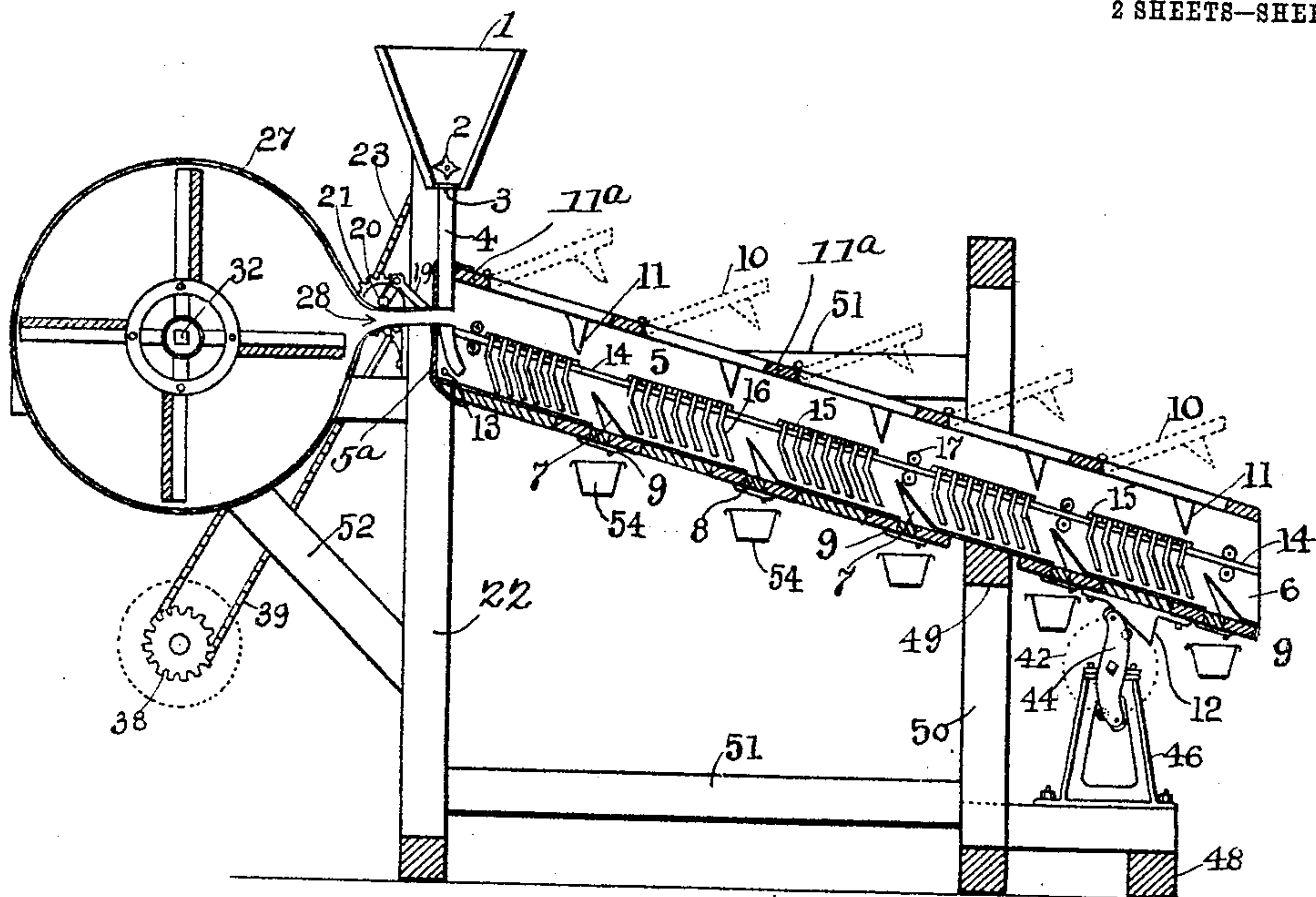


Fig. 1.

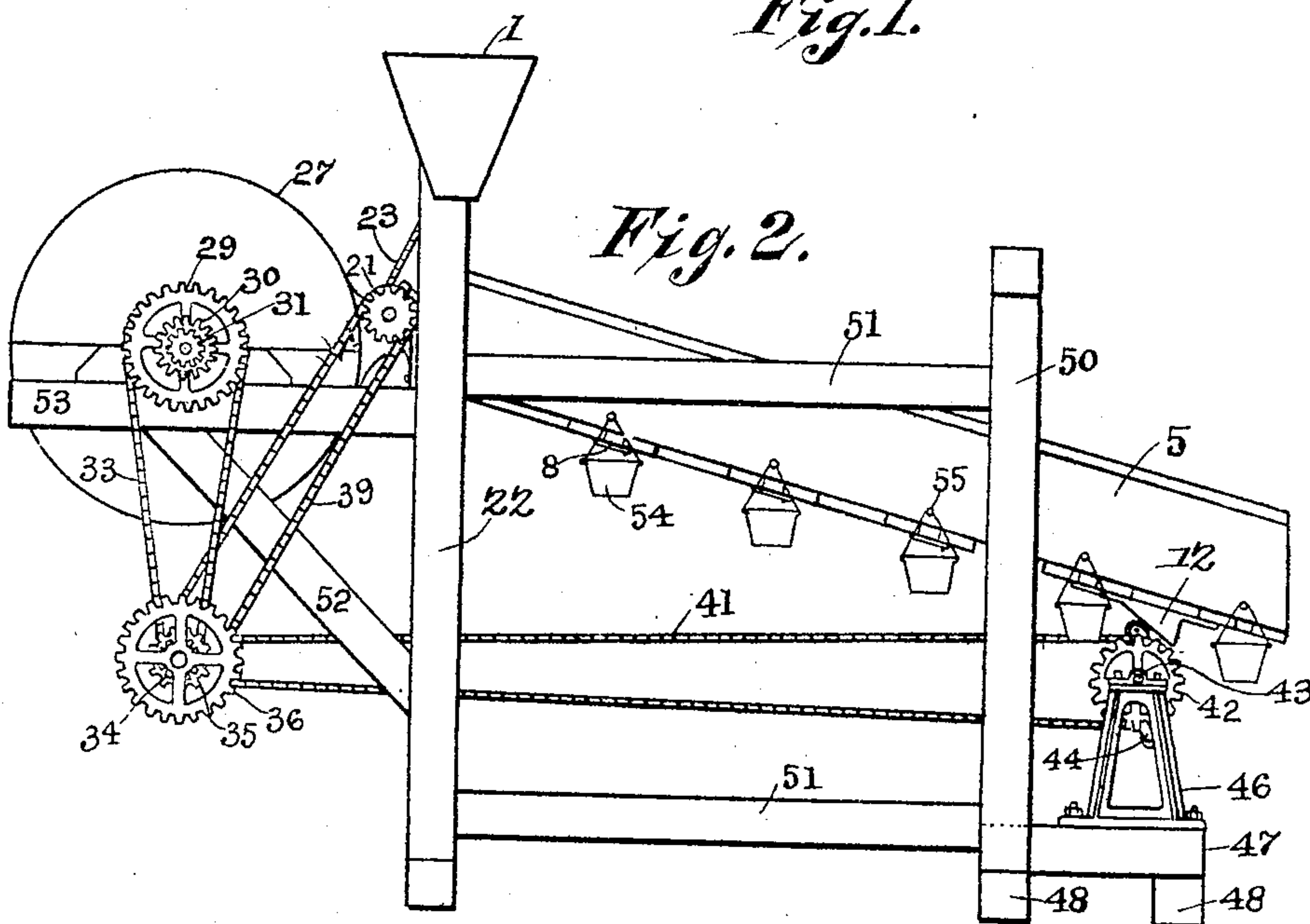


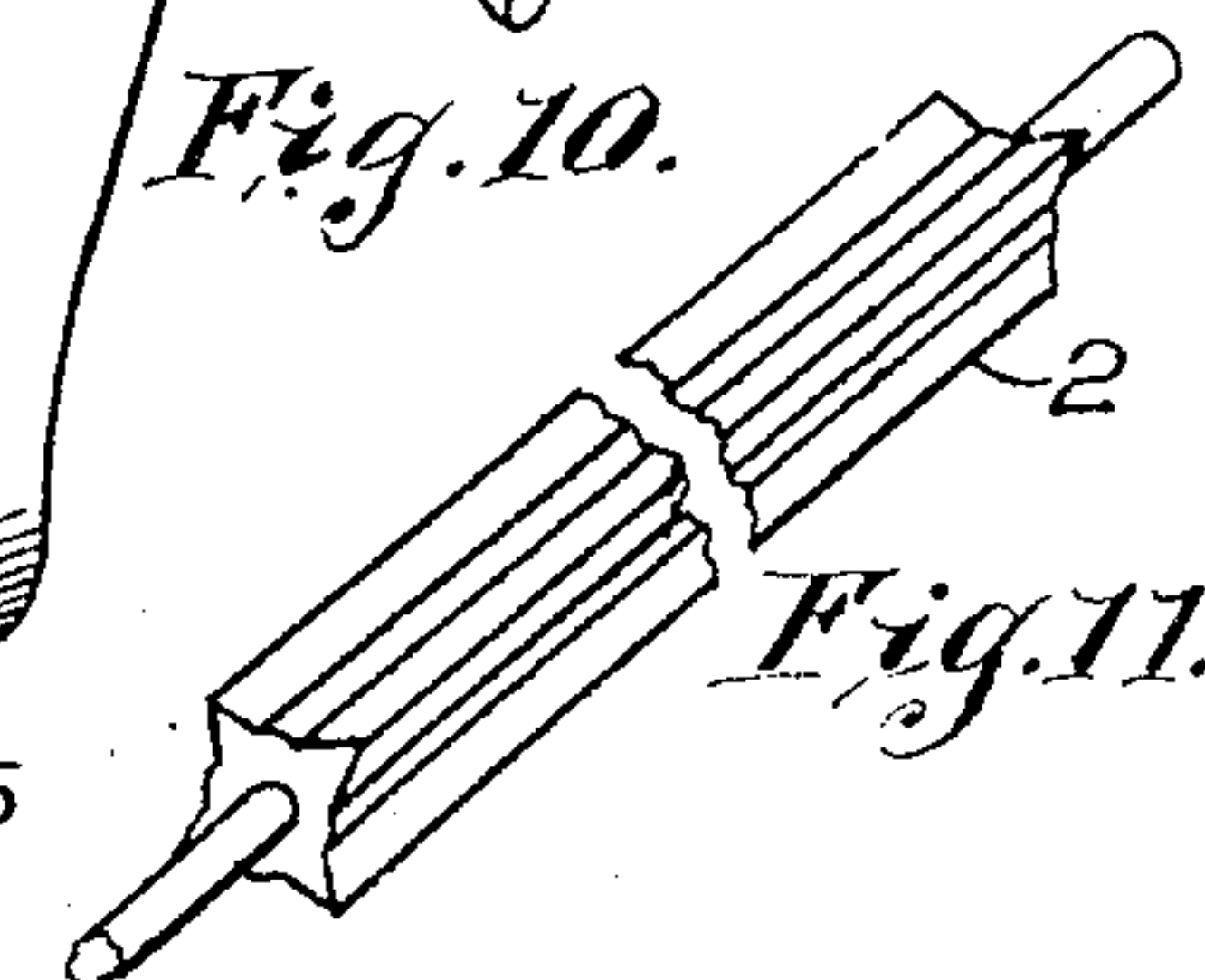
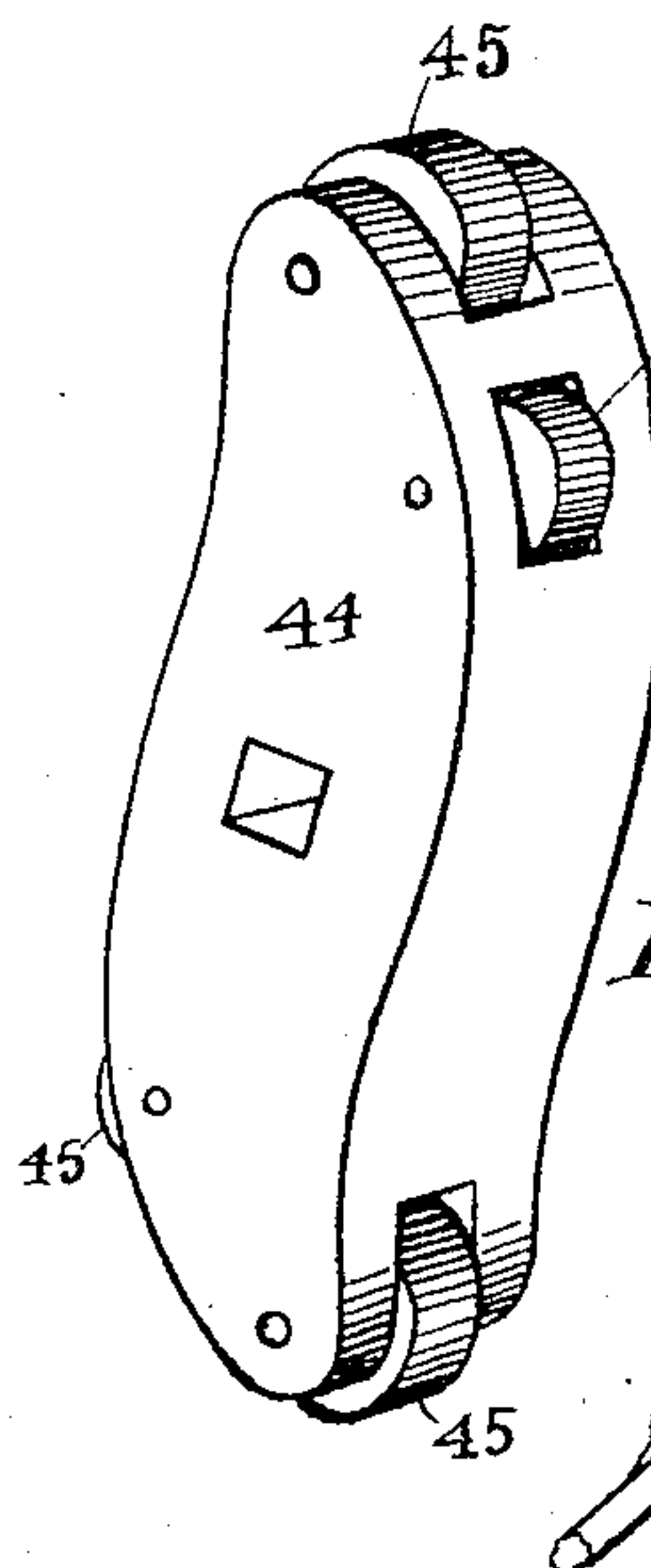
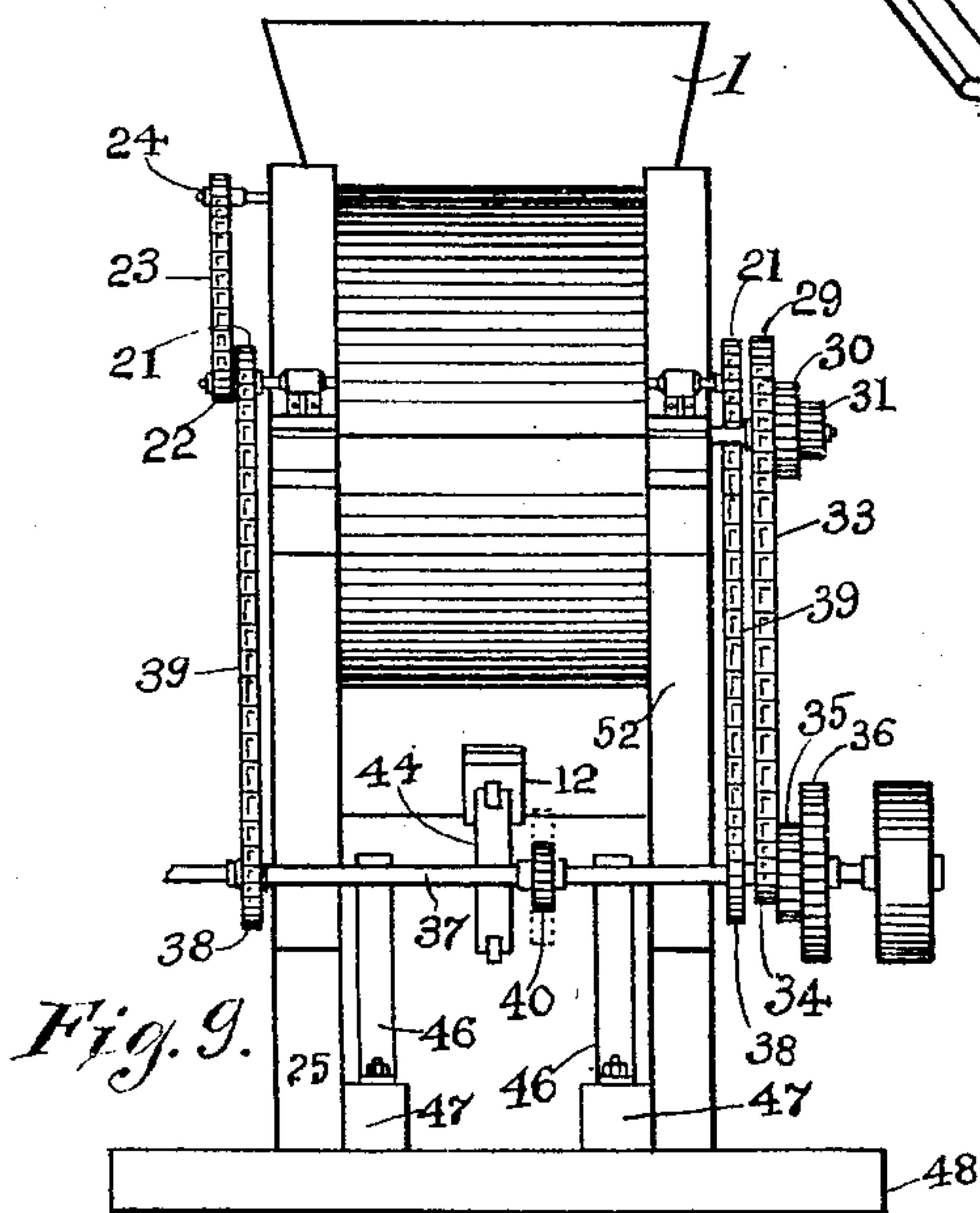
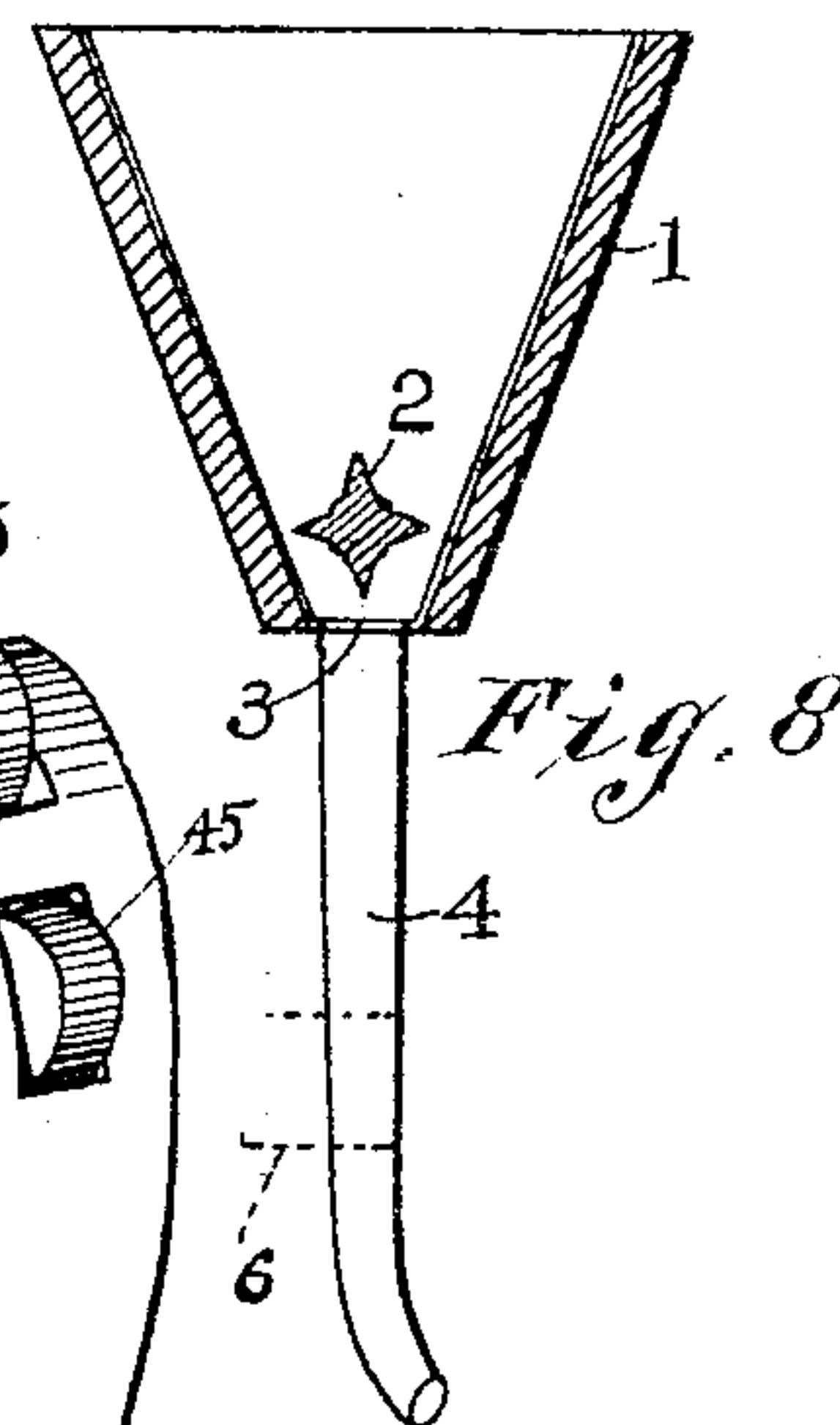
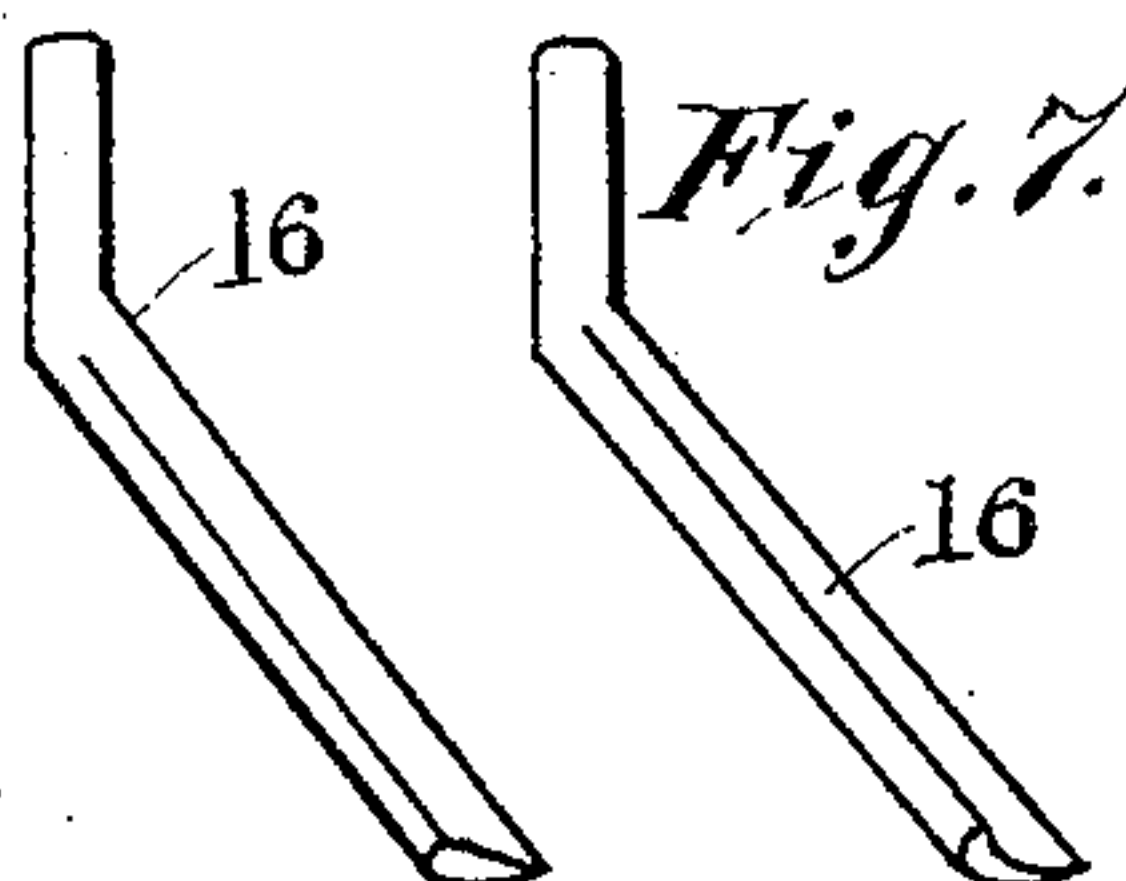
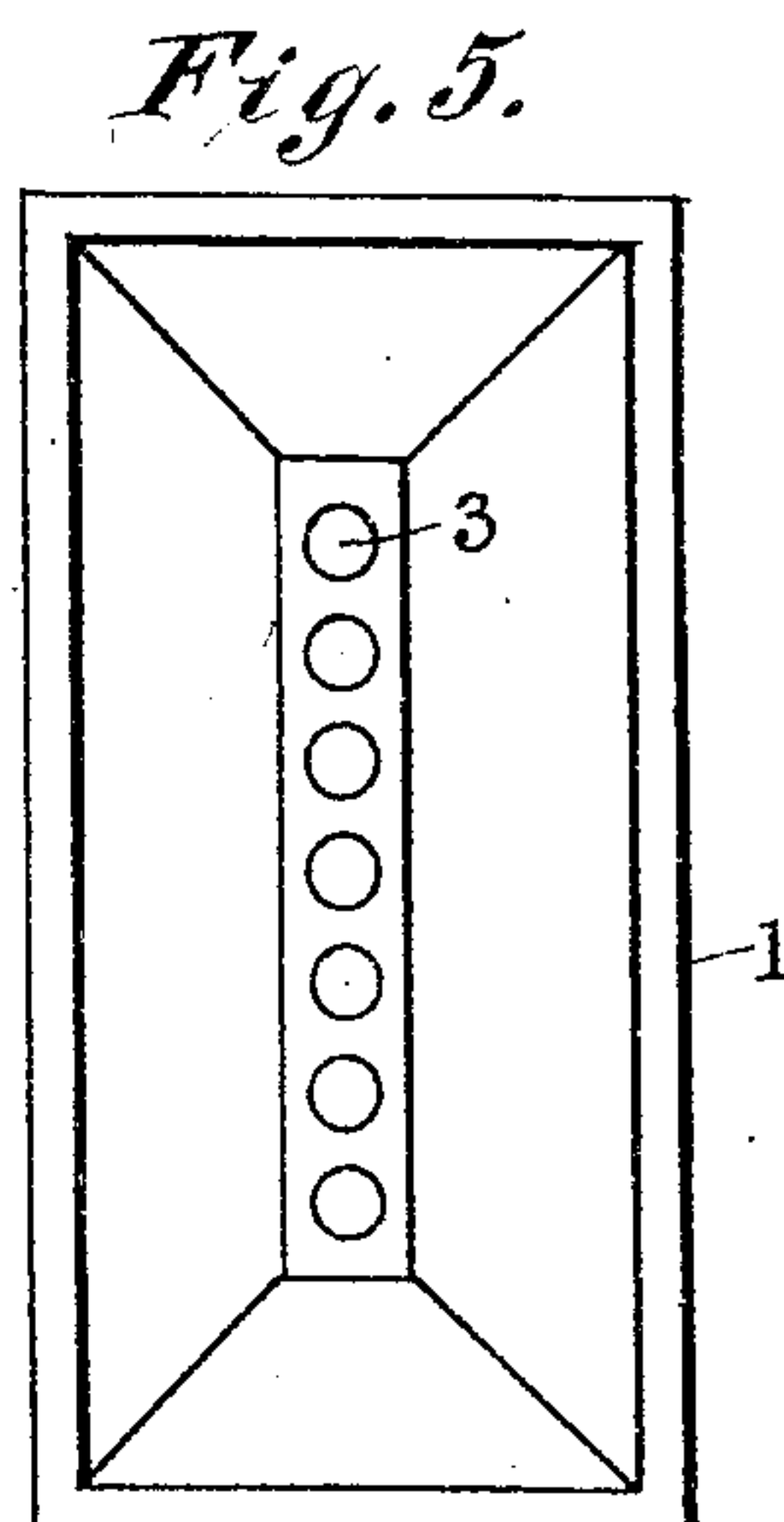
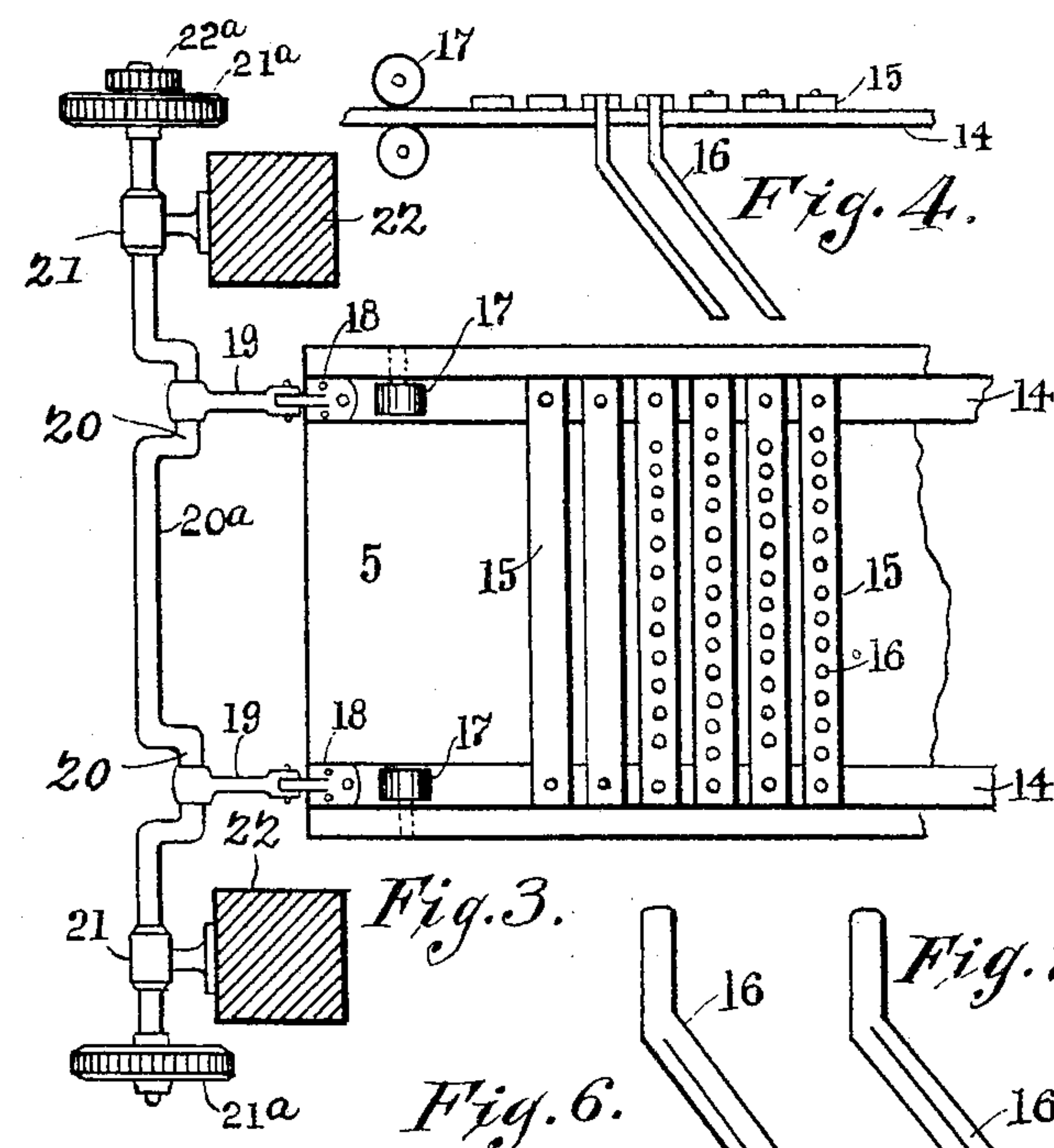
Fig. 2.

Witnesses:  
*E. J. Stewart*  
*R. M. Elliott*

*James J. Kennedy,*  
Inventor.  
by *Cashow & Co*  
Attorneys.

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2 SHEETS—SHEET 2.



Witnesses:  
*E. G. Stewart*  
*R. M. Elliott*

*James J. Kennedy,*  
Inventor:  
by *C. A. Snow & Co.*  
Attorneys.



# UNITED STATES PATENT OFFICE.

JAMES J. KENNEDY, OF GUTHRIE, OKLAHOMA TERRITORY.

## ORE-CONCENTRATOR.

No. 803,830.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed December 10, 1904. Serial No. 236,387.

*To all whom it may concern:*

Be it known that I, JAMES J. KENNEDY, a citizen of the United States, residing at Guthrie, in the county of Logan and Territory of Oklahoma, have invented a new and useful Ore-Concentrator, of which the following is a specification.

This invention relates generally to ore-concentrators, and particularly to one adapted for dry placer-gold concentration.

The object of the invention is in a rapid, ready, thoroughly feasible, and practical manner and without the employment of concentrates or fluids of any kind to effect separation of gold from ores or earth bearing them.

With the above and other objects in view the invention consists, generally stated, in a peculiar construction of sluice-box, riffles, agitators, air-guides, and means for supplying air to the sluice-box.

More generally stated, the invention consists in the provision of an ore-concentrator of the character specified in which the operator will be enabled to deposit the earth containing the precious metals at the bottom of the sluice-box and at a point where the current of air will have the least effect upon it, in which the power of gravity, accelerated by the concussion of the sluice-box, will slowly and positively cause the precious metals to be carried down the bed of the sluice-box to the bottom of the riffles, where it can be removed; in which the action of a system of rakes or agitators operating in opposition to the motion or course of the material down the sluice-box will assist in settling or sifting the precious metals to the bottom of the box and at the same time cause the debris or worthless material to be brought to the surface, where it will be met and acted upon and carried over the riffles by the current of air; in which the debris which lodges or is caught by the riffles will be taken up by the rakes or agitators and pushed backward up the sluice-box and caused to mingle with the incoming earth, during which procedure the precious metals will be continuously sifted to the bottom of the sluice-box, and in which, if the load should become so heavy as to prevent the rakes or agitators from keeping the riffles clean, the concussion of the sluice-box may be relied upon to cause the earth at the top of the riffles to pass over to the next riffle, and so on until the operation is completed.

In the accompanying drawings, forming a

part of this specification, and in which like characters of reference indicate corresponding parts, there is illustrated one form of embodiment of the invention capable of carrying the same into practical operation, it being understood that the elements therein exhibited may be varied or changed as to shape, proportion, and exact manner of assemblage without departing from the spirit thereof, and in these drawings—

Figure 1 is a view in vertical longitudinal section through an ore-concentrator constructed in accordance with the present invention. Fig. 2 is a view in side elevation. Fig. 3 is a view in top plan. Fig. 4 is an enlarged detail view. Fig. 5 is a detail plan view on an enlarged scale. Figs. 6 and 7 are detail views on an enlarged scale. Fig. 8 is a vertical sectional view, on an enlarged scale, through the hopper. Fig. 9 is a view in end elevation. Figs. 10 and 11 are perspective detail views, on an enlarged scale, exhibiting certain parts of the apparatus.

Referring to the drawings and to Figs. 1, 2, and 9 thereof, 1 designates a hopper arranged near the bottom and extending entirely across the width of which is a fluted or approximately star-shaped rotary feed-wheel or feeder 2. The interior of the hopper is lined with some suitable material to resist the action of the ores, preferably galvanized iron, and is provided at its bottom with a plurality of circular orifices 3, in which are soldered or otherwise secured the upper ends of a series of vertical tubes or spouts 4—in this instance seven, this corresponding to the number of orifices in the hopper. These tubes are slightly curved rearwardly at their bottoms and are made of any suitable material, preferably galvanized iron. The lower curved ends of the spouts terminate quite close to the bottom of an inclined sluice-box 5, which is constructed, preferably, of wood and lined with metal. Surrounding the bottom, sides, and upper end of the sluice-box is a flexible neck or joint 5<sup>a</sup>, which may be constructed of canvas or any other material suitable for the purpose, which is designed to allow free reciprocatory movements of the sluice-box and also to prevent the escape of air supplied to the sluice-box, the canvas being tightly fitted around the air-channel 6 for this purpose, said channel forming the escape-duct of a fan presently to be described.

The sluice-box is provided with any suitable



number of riffles 7, which are preferably constructed of galvanized iron, and in the bottom of the sluice-box in front of each riffle are transverse slots or holes of any suitable size, 5 which extend between the sides of the sluice-box and are closed by blocks 8, which fit snugly within and against the holes of the sluice-box and held in place by buttons or cleats 9, as clearly shown in Fig. 1. The top 10 of the sluice-box is provided with doors 10, of which there may be any desired number and which constitute, in effect, the top of the sluice-box, the under side of the doors having combined with them air-deflectors 11, the 15 function of which will presently appear. As shown in Fig. 1, the doors are hinged to battens or cross-strips 11<sup>a</sup>; but it is to be understood that, if preferred, the doors may simply be supported by these battens and not 20 hinged thereto, and as this will be obvious detailed illustration thereof is deemed unnecessary. To the under side of the sluice-box, near its lower end, is secured a toe 12, which, by coaction with mechanism presently to be 25 described, imparts a vertical vibratory motion to the sluice-box which vibrates about its pivot formed by a rod 13, which passes through two of the vertical frame-standards of the machine and operates to hold the sluice- 30 box in operative position.

Extending longitudinally of the sluice-box are two slide-bars 14, to which are secured transverse strips 15, which carry downward-projecting and rearwardly-deflected rakes or 35 agitators 16, the slide-bars working between and being guided by pairs of wheels or rollers 17, mounted upon suitable journals carried by the sides of the sluice-box. Attached to the upper ends of the slide-bars are castings 40 18, to which are connected one end of each of a pair of pitman-rods 19, the other ends of which engage cranks 20 of the crank-shaft 20<sup>a</sup>, which works in bearings 21, carried by two vertical frame-standards 22, as clearly 45 shown in Fig. 3. The crank-shaft is revolved by two sprocket-wheels 21<sup>a</sup>, and on the outside of one of these sprocket-wheels at one end of the shaft is a similar sprocket-wheel 22<sup>a</sup>, which drives a sprocket-chain 23, and the 50 latter operates a sprocket-wheel 24 on the end of the shaft of the feeder 2 outside of the hopper 1, as seen in Fig. 9.

At the upper end of the sluice-box is a fan 27, the casing of which carries the air-channel 6, before referred to, which fan feeds air 55 into the sluice-box at a suitable point herein-after more fully described. The fan is preferably constructed as shown in longitudinal section in Fig. 1 and is driven by sprocket- 60 wheels 29, 30, and 31, carried by one end of the fan-shaft 32. Passing around the sprocket-wheel 29 is a sprocket-chain 33, which passes around a sprocket-wheel 34 on a shaft 37, located beneath the fan-casing, the said shaft 65 also having combined with it two other

sprocket-wheels 35 and 36. The shaft also carries two other sprocket-wheels 38, around which pass sprocket-chains 39, that engage the sprocket-wheels 21 at the respective ends 70 of the crank-shaft 20<sup>a</sup>. The shaft 37 carries, in addition to the sprocket-wheels above mentioned, a sprocket-wheel 40, which is located adjacent to its center and around which passes a sprocket-chain 41, which engages a sprocket- 75 wheel 42 on a shaft 43, mounted in suitable bearings upon standards 46, secured to one of the sill-pieces 47 of the frame, the said sill-pieces being supported by base-timbers 48, as clearly shown in Figs. 1 and 2.

Carried by the shaft 43 is a two-throw lifter 80 44, which carries at its terminals and adjacent thereto rollers 45, which are designed to engage with the toe 12. The rear or lowest end of the sluice-box rests upon a cross-piece or stop-block 49, which is secured between ver- 85 tical frame-standards 50, longitudinal timbers 51 at each side of the apparatus serving to strengthen the frame. The fan-casing is supported by horizontal timbers 53, supported by brackets 54, connecting with the frame- 90 standards 22 and the timbers 53.

To receive the precious metals from between the riffles, buckets or receptacles 54 are disposed beneath each of the slots or holes in the bottom of the sluice, said buckets being 95 suspended by hooks 55 or the like from the outer side of the sluice-box.

In the operation of the device the gold-bearing dirt is placed in the hopper 1 and is forced 100 through the tubes 4 by the feeder 2 to the bottom of the sluice-box, the ore being deposited before it is affected by the action of the air-current or by the power of gravity. After having been deposited upon the bottom 105 of the sluice-box it is acted upon by the rakes or agitators, which operate in opposition to the action of gravity and air. The current of air, which is controlled by the deflectors 11, strike the dirt and carries the lighter part 110 over and past the riffle, leaving the heavier material in front of the riffle and at the bottom of the sluice-box. This same action is continued throughout the entire length of the sluice-box. The operation is materially as- 115 sisted by the motion of the sluice-box and by its impact or concussion upon the stop-block 49, which when the riffle is full will cause the heavier material to sift to the bottom and at the same time force the lighter material over 120 the several riffles to the discharge, this action being brought about by the coaction between the toe and lifter, as will be readily understood.

It will be seen from the foregoing description that although the apparatus of this in- 125 vention is exceedingly simple of construction it will be found of the highest efficiency and durability in use and in a thoroughly practical manner eliminates the necessity of the em- 130 ployment of any concentrates or liquids in separating the gold from the earth.



Having thus described the invention, what is claimed is—

1. In an ore-concentrator, a sluice-box, means for delivering ore thereto at a point  
5 near its bottom, and means for supplying air to the box in a plane above that of the feed of the ore and toward the top of the box.
2. In an ore-concentrator, a sluice-box, means for supplying ore thereto at a point  
10 near its bottom, means for supplying air to the box in a plane above that of the feed of the ore and toward the top of the box, and means for deflecting the current of air.
3. In an ore-concentrator, a sluice-box,  
15 reciprocatory agitators therein, means for discharging ore in the path of movement of the agitators, and means for supplying air to the box above the operative plane of the agitators and toward the top of the box.
- 20 4. In an ore-concentrator, a vibratory sluice-box, reciprocatory agitators arranged therein, riffles disposed between the agitators, means for supplying ore to the box at the operative plane of the agitators, means for supplying air to the sluice-box above the operative plane of the agitators and toward the top  
25 of the box, and deflectors arranged in the path of travel of the ore.
5. In an ore-concentrator, the combination  
30 with an inclined sluice-box and riffles and agitating mechanism arranged therein, of blast mechanism discharging into the sluice-box above the agitators, and doors arranged in the top of the sluice-box and carrying air-deflectors.  
35
6. In an ore-concentrator, the combination with a vibratory inclined sluice-box carrying

riffles, of reciprocatory agitators arranged therein, blast mechanism coacting with the sluice-box and discharging above the agitators  
40 air-deflectors arranged above the agitators, and means for supplying divided bulks of ore to the sluice-box.

7. In an ore-concentrator, the combination with a sluice-box, of a hopper containing stirring mechanism, a plurality of tubes communicating with the hopper and discharging  
45 near the bottom of the sluice-box, reciprocatory agitators disposed within the sluice-box, means for imparting vertical vibratory movement to the sluice-box, blast mechanism coacting with the sluice-box, and air-deflectors arranged within the sluice-box and in the line  
50 of the discharge of air in the blast mechanism.

8. In an ore-concentrator, the combination  
55 with a sluice-box, and mechanism for vibrating the same, of doors arranged in the top of the sluice-box and carrying air-deflectors, riffles secured to the bottom of the sluice-box, separable sections disposed in front of the  
60 riffles and means for holding the same combined with the bottom of the sluice-box, reciprocatory agitators disposed between the riffles, blast mechanism discharging in the plane of the deflectors, and means for supply-  
65 ing ore to the sluice-box below the discharge from the blast mechanism.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JAMES J. KENNEDY.

Witnesses:

W. H. MERTEN,  
C. E. CARPENTER.