

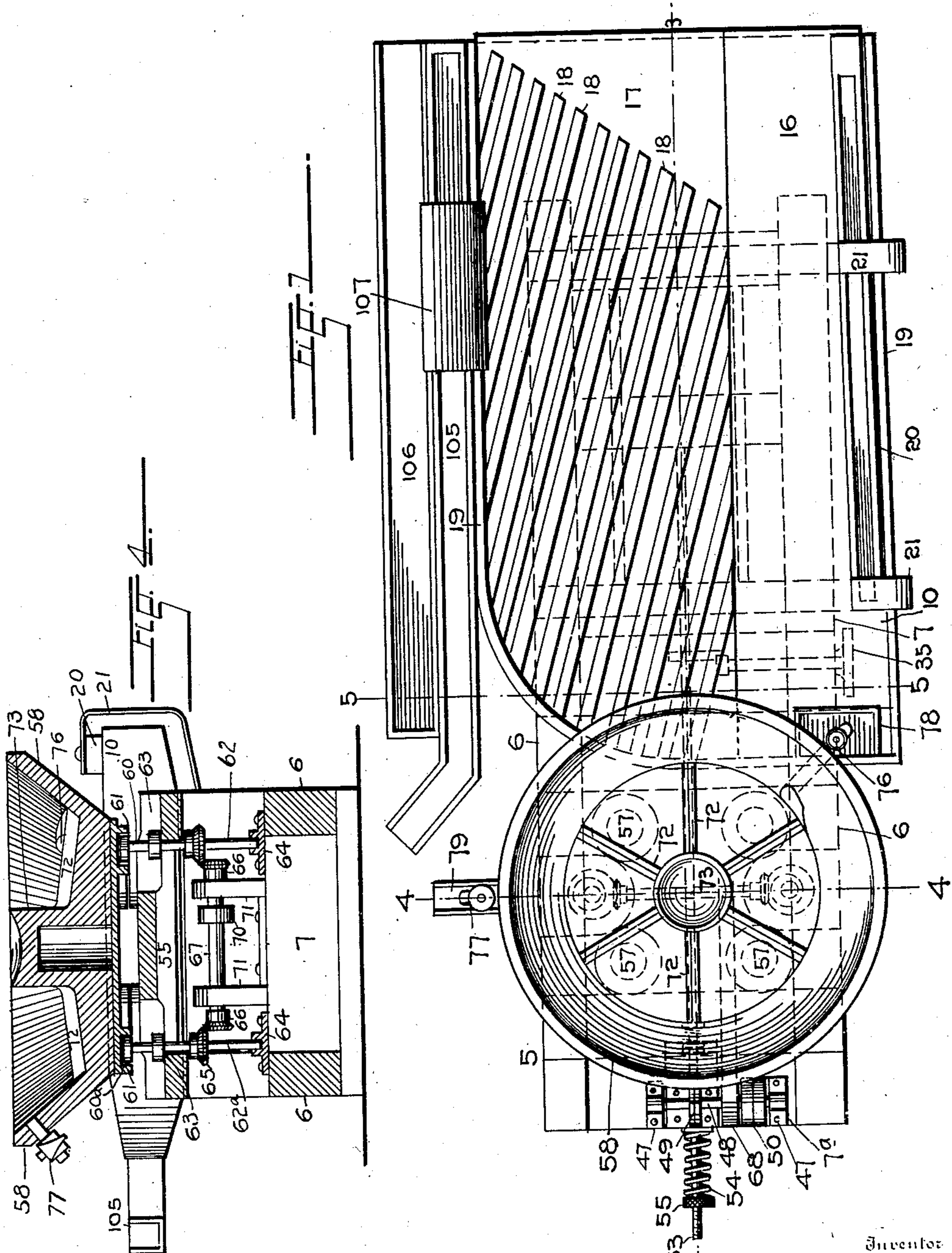
No. 845,449.

PATENTED FEB. 26, 1907.

M. CHRISTMANN.
ORE CONCENTRATOR.

APPLICATION FILED JUNE 7, 1905.

4 SHEETS--SHEET 1.



Witness

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4 SHEETS—SHEET 2.

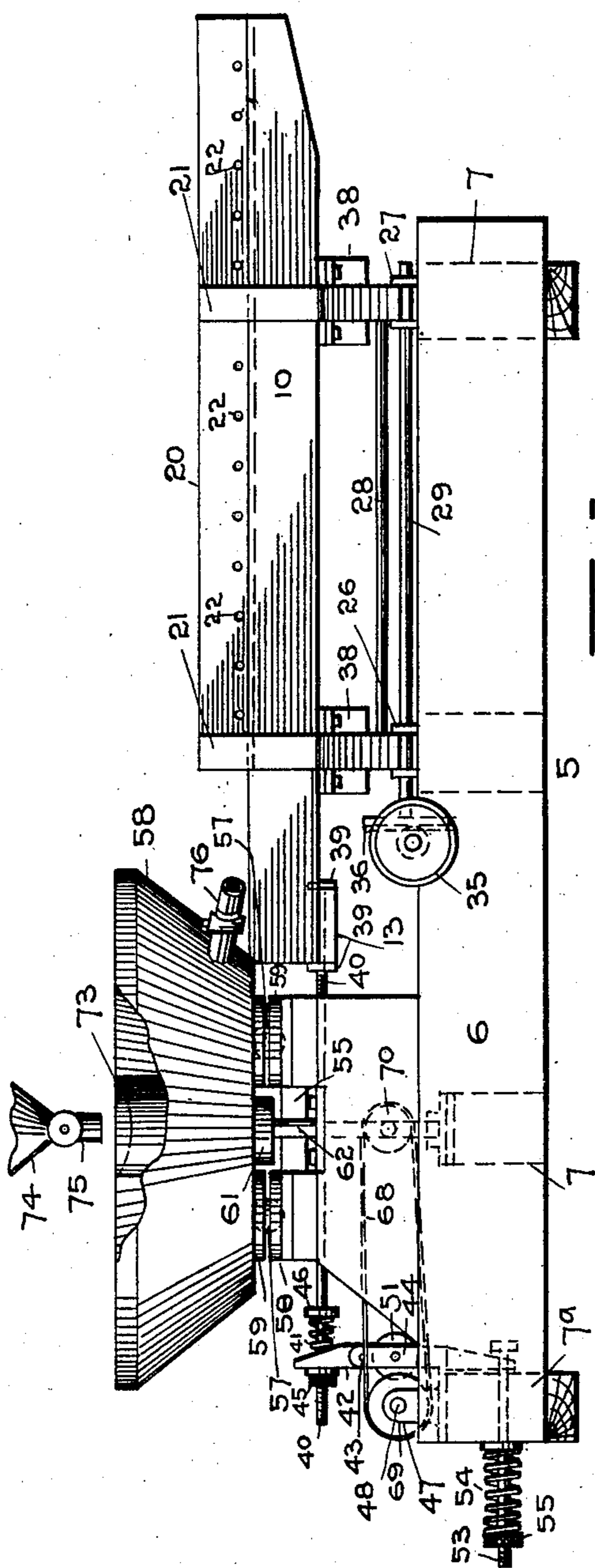


Fig. 2.

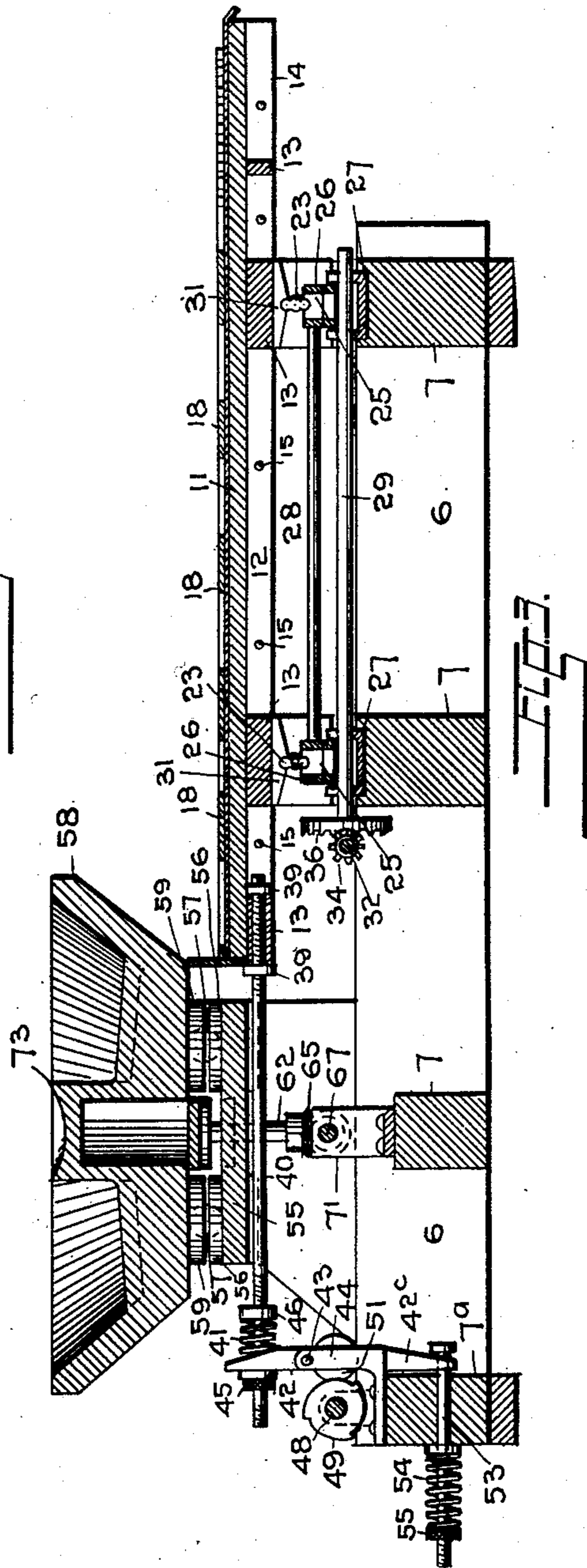


Fig. 3.

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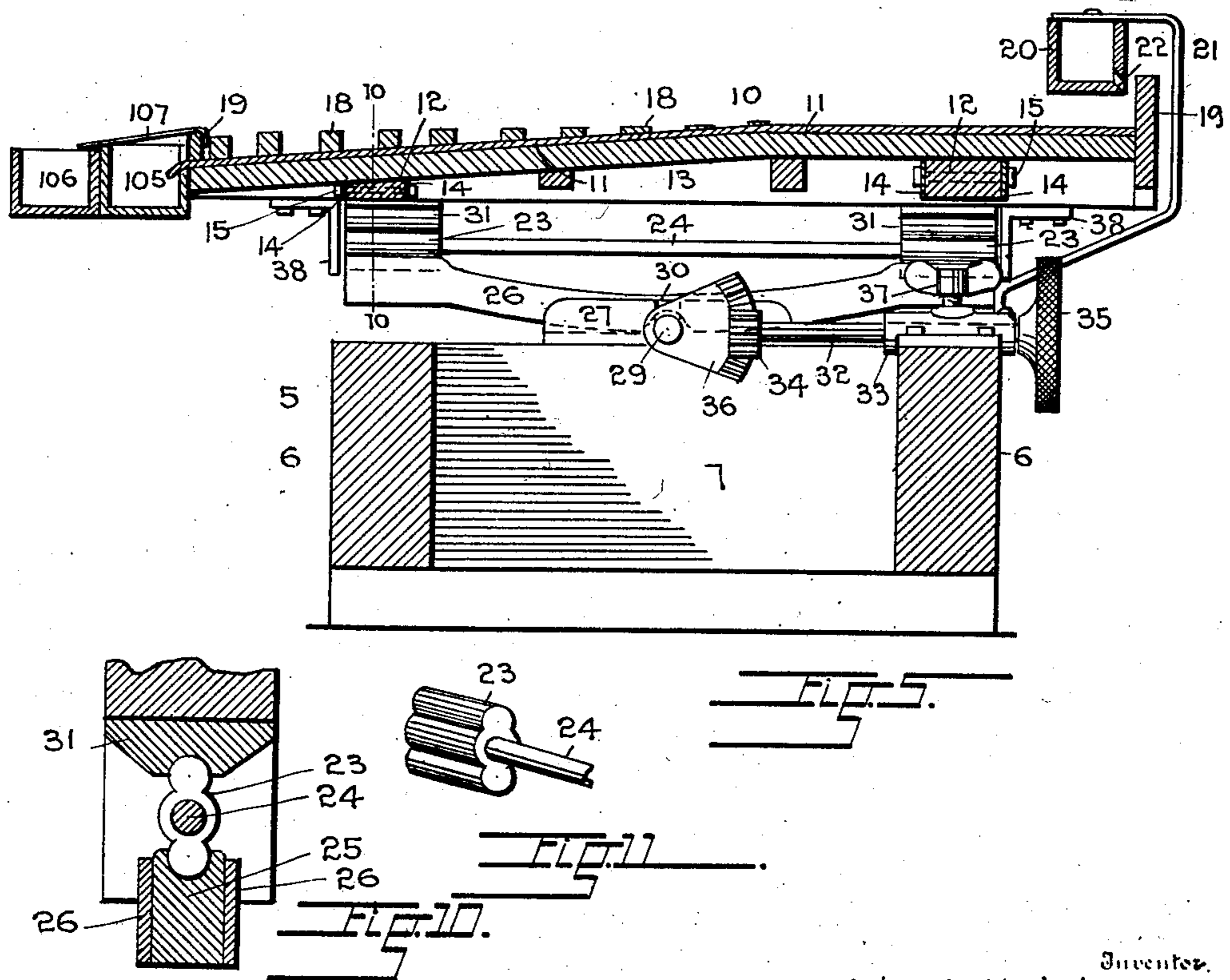
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

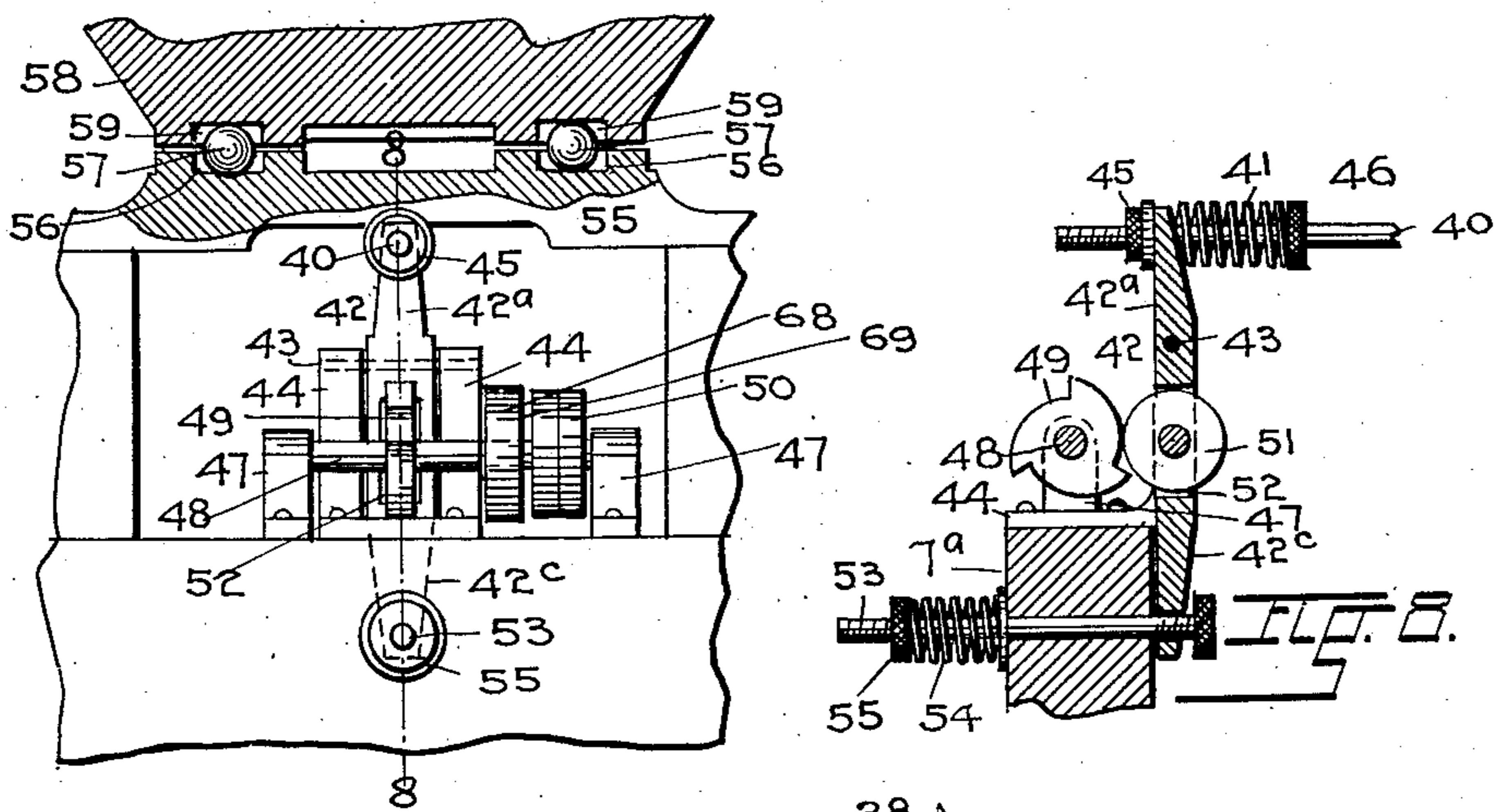
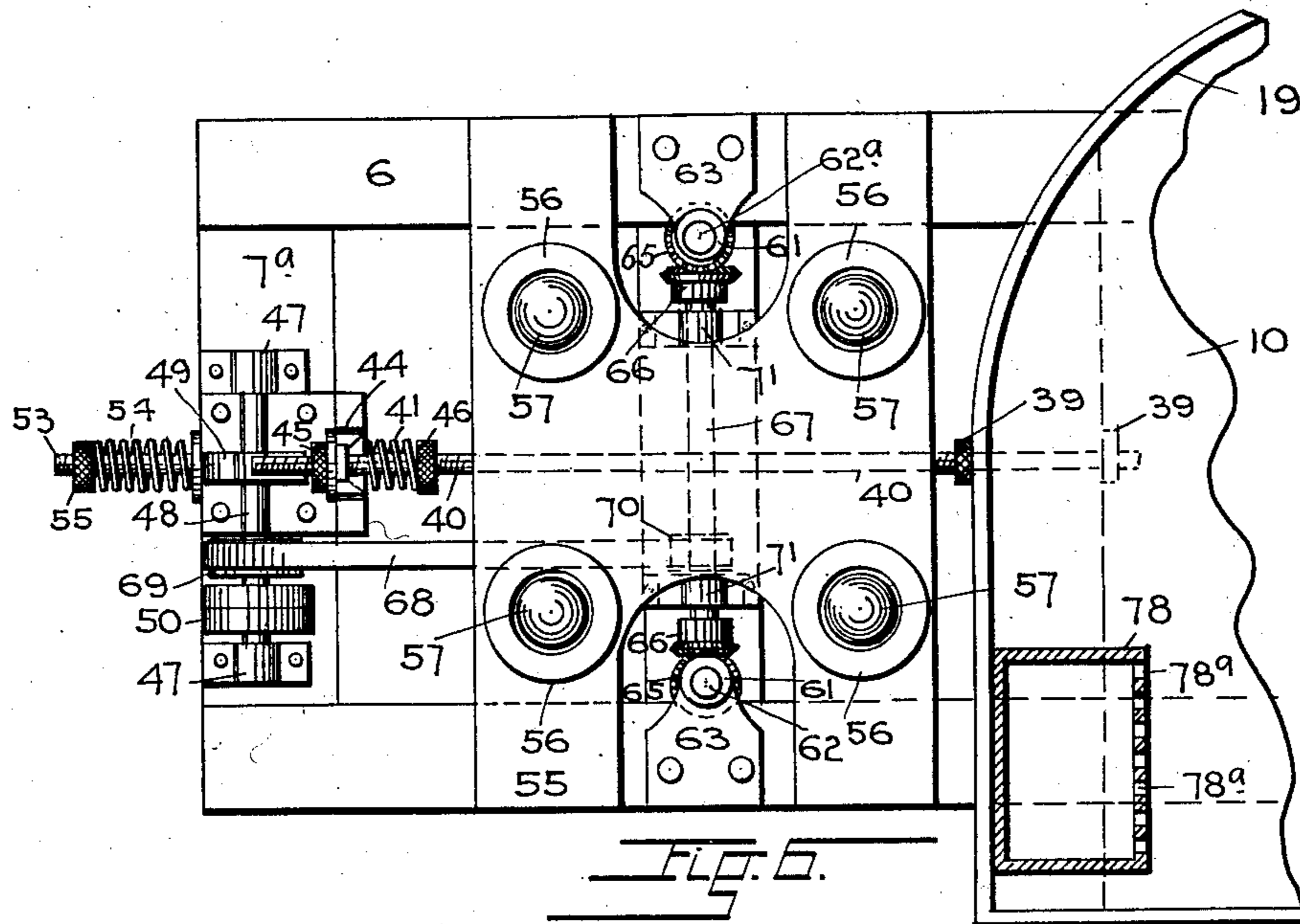


FIG. 7.

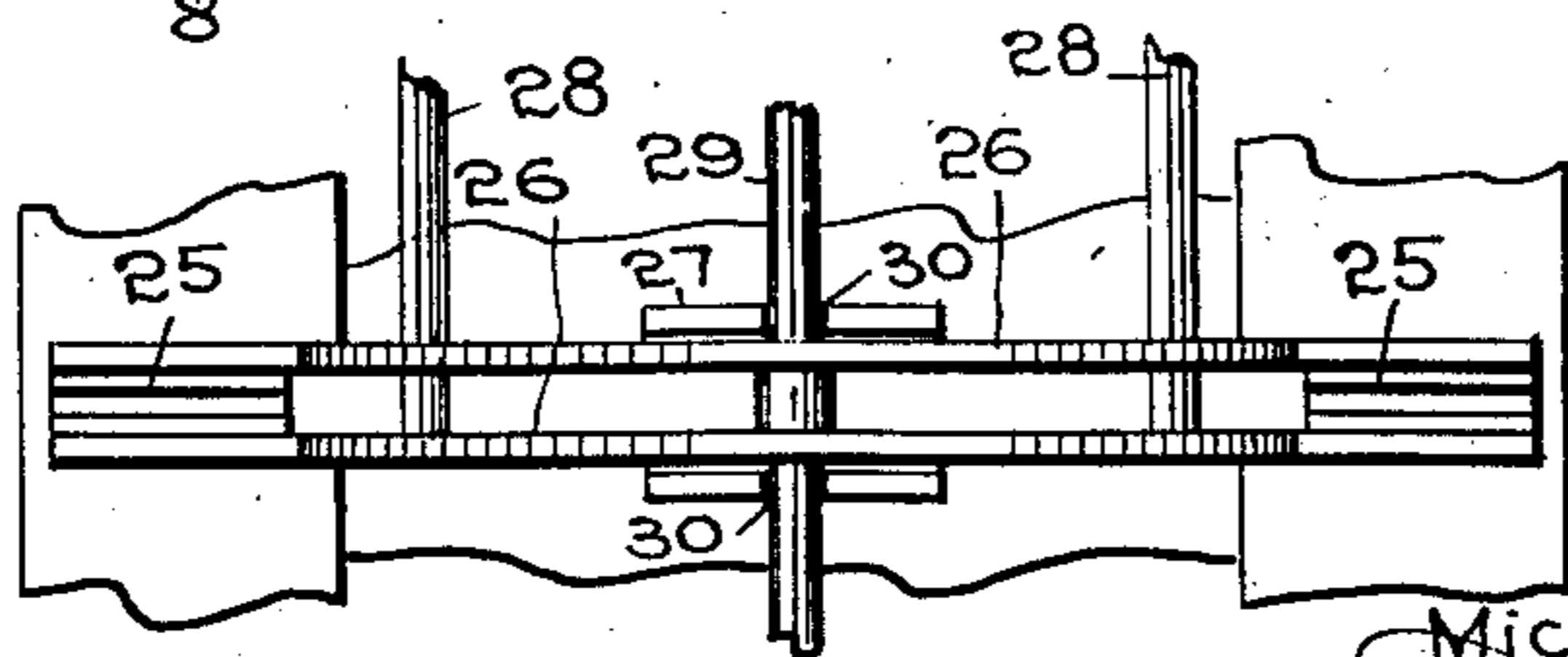


FIG. 8.

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UNITED STATES PATENT OFFICE.

MICHAEL CHRISTMANN, OF LEADVILLE, COLORADO.

ORE-CONCENTRATOR.

No. 845,449.

Specification of Letters Patent.

Patented Feb. 26, 1907.

Application filed June 7, 1905. Serial No. 264,154.

To all whom it may concern:

Be it known that I, MICHAEL CHRISTMANN, a citizen of the United States of America, residing at Leadville, in the county of Lake and State of Colorado, have invented certain new and useful Improvements in Ore-Concentrators, of which the following is a specification.

My invention relates to improvements in ore-concentrators, and has for object to provide an apparatus which, being simple and efficient, will adequately separate the mineral from the gangue during one operation, thereby obviating repeating and consequent use of elevators and similar appliances and saving time and labor. I attain these objects by the mechanism illustrated in the accompanying drawings, in the several figures of which like parts are similarly designated, and in which—

Figure 1 represents a plan view of the apparatus; Fig. 2, a side elevation thereof; Fig. 3, a vertical longitudinal section there-through; Fig. 4, an enlarged vertical cross-section taken along line 4 4, Fig. 1; Fig. 5, an enlarged vertical cross-section along line 5 5, Fig. 1; Fig. 6, an enlarged plan view of the "movement end" of the stationary frame; Fig. 7, a sectional fragmentary end view thereof; Fig. 8, a section along line 8 8, Fig. 7; Fig. 9, a fragmentary plan view of part of the stationary frame and superposed rocker-arm; Fig. 10, an enlarged fragmentary section along the line 10 10, Fig. 5; Fig. 11, a perspective view of one of the table-supporting rockers.

5 represents the bed or base frame, consisting of the longitudinal beams 6 and 6 and cross-timbers 7, securely bolted together to form a rigid and adequate support for the table, operating mechanism, and other parts of my device. Mounted on frame 5 is the longitudinally-movable table 10, composed of the linoleum-covered deck 11, securely braced on girders 12 and suitable cross-timbers 13. To further strengthen the structure and prevent warping, girders 12 may be lined with metal plates 14, secured thereto by bolts 15.

Deck 11 is longitudinally divided into two parts 16 and 17, the former of which is plain and normally level, while the other is provided with diagonally-extending riffles 18 and inclines toward the lower or gangue-discharge side of the table. Riffles 18, which, if so desired, may be made to taper from the head to the foot end of the deck, terminate a

certain distance from the table's outer edge, leaving a smooth plane for final separation of the mineral from the gangue.

Table 10 is, with the exception of its foot or discharge end, provided with upwardly-extending flanges 19 and surmounted on its upper edge by a water-trough 20, supported on suitably-formed brackets 21 and provided on its outer side with a series of discharge-apertures 22. The table is movably supported on two pairs of rockers 23, interposed between it and the stationary frame, each pair of rockers being connected by a transversely-extending rod 24. The lower rounded extremities of rockers 23 are supported in correspondingly-shaped dies 25, secured in the outer and upwardly-extending extremities of parallel curved rocker-arms 26, which are mounted transversely of frame 5 in chairs 27, centrally secured on the cross-timbers 7. Arms 26 are connected by tie-rods 28 and a pivot-rod 29, which being secured at their lowermost point extends beyond the arms and is mounted in slots 30 in chairs 27. Lateral deflection of the table is prevented by guide-plates 38, secured to the under side of the table and engaging the outer surfaces of rockers 23. The upper extremities of rockers 23 extend in inverted dies 31, shaped similarly to those on the curved rocker-arms and rigidly secured in corresponding positions to suitable parts of the table-frame.

It will be observed that the above-described arrangement of parts not only permits longitudinal movement of the table, but also allows it to be transversely inclined by reason of its being pivotally mounted in chairs 27 through instrumentality of the pivot-rod 29.

The transverse inclination of the table is adjustable by means of a short shaft 32, rev-olubly mounted in a bearing 33 on the stationary frame and provided with a pinion 34 at its inner end and a hand-wheel 35 at its outer extremity. Pinion 34 meshes into a segmental gear 36 on the inner extremity of pivot-rod 29, and the various parts may be held in any desired position by a set-screw 37, extending through box 33 and engaging shaft 32.

During the operation of the device a rapid longitudinal reciprocating or vibrating motion is imparted to the table by the mechanism mounted on the upper end of the stationary frame and which will now be described.

Rigidly secured to table 10 by nuts 39 is the forwardly and longitudinally extending draw or thrust rod 40, the outer extremity of which extends through a spring 41 and an aperture in the extremity of the upper arm 42^a of a vertical lever 42, fulcrumed at 43 in a standard 44, which is mounted on the stationary frame 5. A nut 45, screwed onto the outer extremity of the draw-rod, engages the outer surface of arm 42^a, while a second nut 46 gives tension to spring 41, which forms an adjustable buffer during the operation of the device.

Mounted in bearings 47, bolted to the stationary frame, is the transverse shaft 48, which carries the cam or wiper wheel 49. Shaft 48 may receive its rotary motion from any convenient source of power by means of pulleys 50. The peripheral surface of wheel 49 engages the periphery of an antifriction-wheel 51, revolvably mounted in a slot 52 in the lower arm 42^c of lever 42, which extends along the inner surface of the end timber 7^a of the stationary frame. A headed rod 53 extends through apertures in the lower extremity of arm 42^c and timber 7^a and through a coil-spring 54, its head engaging the surface of said arm, while a nut 55, screwed onto its outer extremity, gives tension to spring 54.

During the operation of the device the rotation of shaft 48 will cause the peripheral projections on the cam-wheel to engage the antifriction-wheel 51 in arm 42^c, which, being forced inwardly, impels the opposite arm of lever 42 to move outwardly, drawing the table with it. Spring 54 is at the same time compressed, with the result that the moment the projection on the wiper-wheel is disengaged from the periphery of the antifriction-wheel the relaxation of said spring will cause the lever and table to resume their original position. In this manner a rapid reciprocating or vibrating movement is imparted to the table, the speed of which may be regulated by the number of peripheral projections on wheel 49.

Although the ore may be fed onto the table in any suitable manner, I preferably and in order to obtain perfect results make use of a pan 58, which is mounted on an elevated platform 55 at the feed end of the table by means of antifriction-balls 57, which, being interposed between the two, engage correspondingly-shaped sockets 56, secured to the platform, and oppositely-located inverted sockets 59 on the lower surface of the pan. Two horizontally-arranged eccentrics 60 and 60^a, extending in correspondingly-shaped sockets 61 on the under surface of the pan, are adapted to impart an eccentric movement to pan 58 and are to this end secured to the upper extremities of vertical shafts 62 and 62^a, mounted in bearings 63 and steps 64 on the stationary frame. Shafts 62 and

62^a are, furthermore, provided with bevel gear-wheels 65, which mesh into corresponding wheels 66 on a counter-shaft 67, mounted in bearings on standard 71, and which is operatively connected with shaft 48 by a belt 68, passing around pulleys 69 and 70 on said shafts. Pan 58, having an outwardly-flaring peripheral side, is provided with a number of radially-extending riffles 72 and a central upwardly-extending cylindrical projection 32, the upper surface of which is concave to receive the pulp discharged thereon through a valve-controlled spout 75 from a superposed receptacle 74. By reason of the eccentric motion of pan 58 the pulp overflowing the edges of projection 32 will thus be fed around all parts of the pan instead of being discharged therein at one point. Pan 58 is, furthermore, provided with two valve-controlled discharge-spouts 76 and 77, the lower one, 76, of which being located near the bottom discharges the heavy and valuable particles contained in the pulp into a feed-box 78, mounted on table 10 and having a number of apertures 78^a, through which the material is spread over the surface of the deck. The upper spout 77, located near the upper edge of the pan, discharges the lighter matter or gangue into a launder 79, which conveys it to a settling-tank or other suitable receptacle. The classifying and feeding apparatus thus described in combination with my table is subject of a separate application for patent, Serial No. 284,193, filed October 24, 1905.

The worthless matter or gangue discharged over the lower or discharge side of the table falls in a launder 105, placed alongside said table, and which, like launder 79, may lead to a settling-tank or other receptacle. A second launder 106, placed alongside launder 105, receives and conveys the silica contained in the pulp, which, collecting at one point on the lower side of the table during the operation of the device, is discharged over an apron 107, which, being hung over the side of the table and launder 105, may be moved to any desired point.

Having thus described the mechanical construction of my device, its operation is as follows: The pulp being discharged from tank 74 through spout 75 onto the concave surface of projection 73 of pan 58, is, as heretofore explained, fed evenly along the inner surface of the pan, in which, by reason of its eccentric motion, resembling that of the ordinary miner's pan, the heavy mineral-bearing particles of the pulp settle on the bottom to be discharged through spout 76 into the feed-box 78 on part 16 of the deck. Being spread over the smooth portion 16 of the table through apertures 78^a in the feed-box, the matter is separated by reason of the vibrating motion of the table, the heaviest and most valuable particles moving along part 16

of the deck to be discharged along its lower end, while the lighter matter, aided by the water supplied from trough 20, will flow over the riffled inclined portion 17 of the table, the riffles on which progressively catch the heavier particles and guide them to the lower or discharge end of the table, while the lighter matter or gangue overflowing the side of the table falls into launder 105.

10 Although the device has been illustrated in the drawings as being in a horizontal position, it may be preferable while operating to incline the same from the head to the tail end by elevating and propping the movement 15 end of the stationary frame.

Having thus described my invention, what I claim is—

1. In combination a stationary frame, a concentration-deck mounted thereon said 20 deck having a level portion extending from end to end thereof and a portion inclining laterally from said level portion, riffles arranged diagonally on said inclined portion, a space being left between the rear ends of the 25 riffles and the end of the deck and means for reciprocating the deck.

2. In combination a stationary frame, a concentrator-deck thereon, said deck having a level portion extending from end to end 30 thereof and a portion inclining laterally from said level portion, riffles diagonally arranged on said inclined portion, a trough located along the side edge of said inclined portion, means for spraying water on the outer edge 35 of the level portion, means for feeding the ma-

terial at the upper end of said level portion, means for reciprocating said deck and means for inclining said deck transversely.

3. In combination, a stationary frame, a concentrator-deck mounted to have a recip- 40 roating movement thereon, a two-armed lever fulcrumed on said frame, a draw-rod connected at one end to said deck and its other end resiliently connected with the upper end of the lever, said connection consisting of a 45 spring and a nut screwed on the draw-rod, a friction-roller carried by the lower end of said lever, a wiper-wheel revolvably mounted on the frame and arranged to engage the said friction-roller, a spring engaging with the 50 lower end of the lever to hold it in its normal position and means for adjusting the said spring.

4. In combination, a stationary frame, parallel segmental rocking arms mounted on 55 said frame, a shaft passing through the centers of said rocking arms, means for rocking said shaft, a rocker carried by each end of each rocking arm, a shaft connecting the rockers on each rocking arm together, each 60 rocker having two rounded portions, one engaging with the rocking arm, a deck resting on the other rounded portion of each rocker, and means for reciprocating the deck.

In testimony whereof I have affixed my 65 signature in presence of two witnesses.

MICHAEL CHRISTMANN.

Witnesses:

JAMES GLYNN,
ANDREW P. ADOLPHSON.