

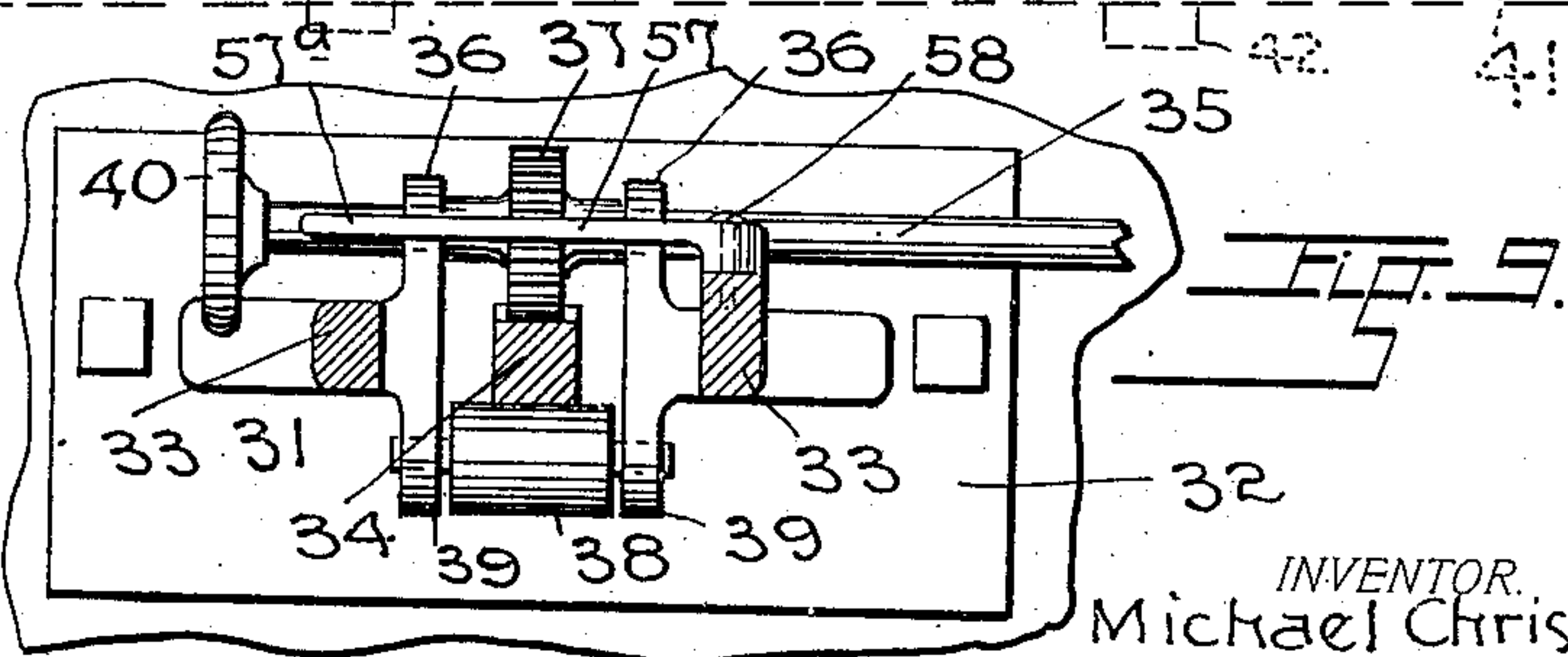
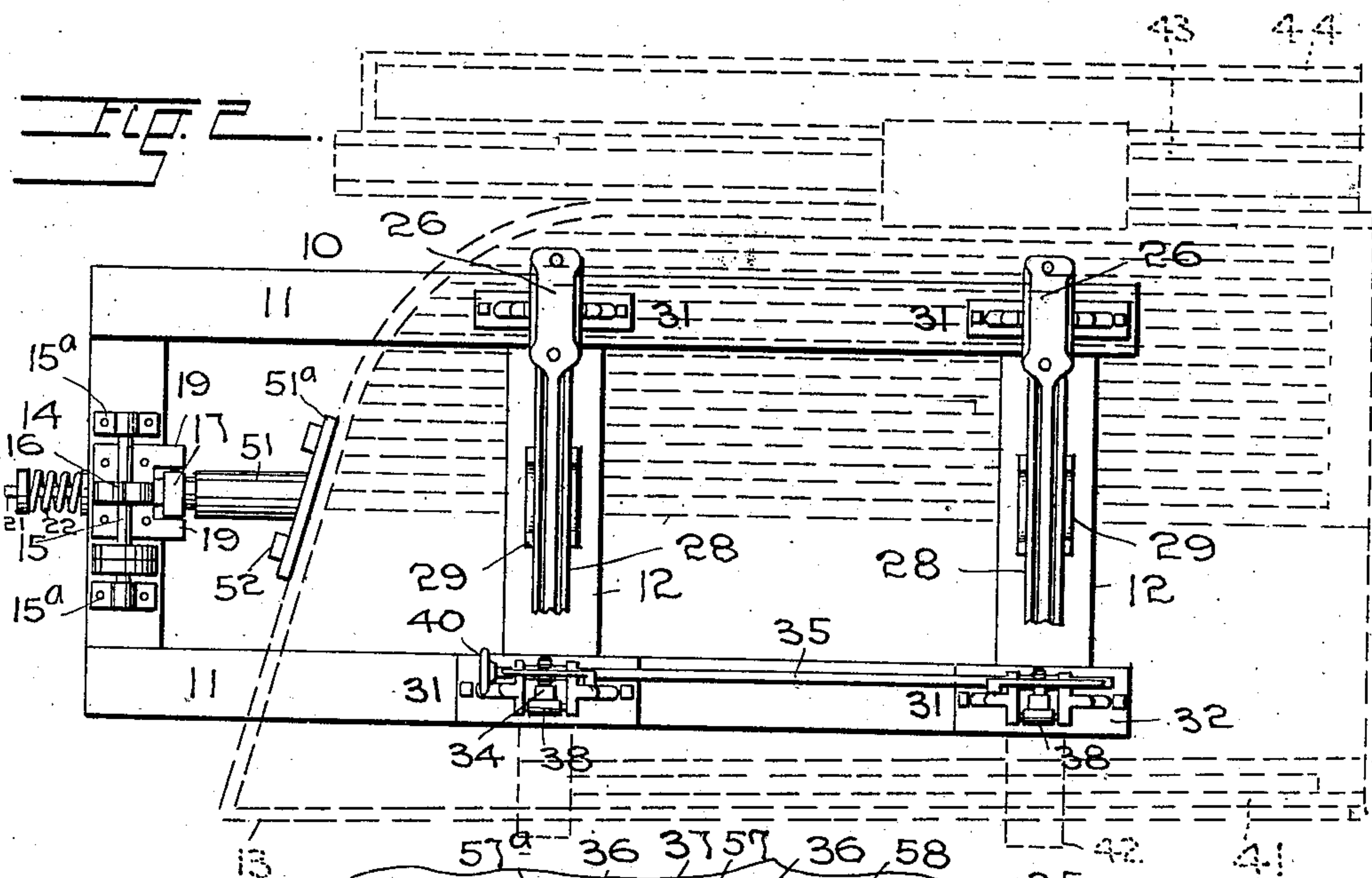
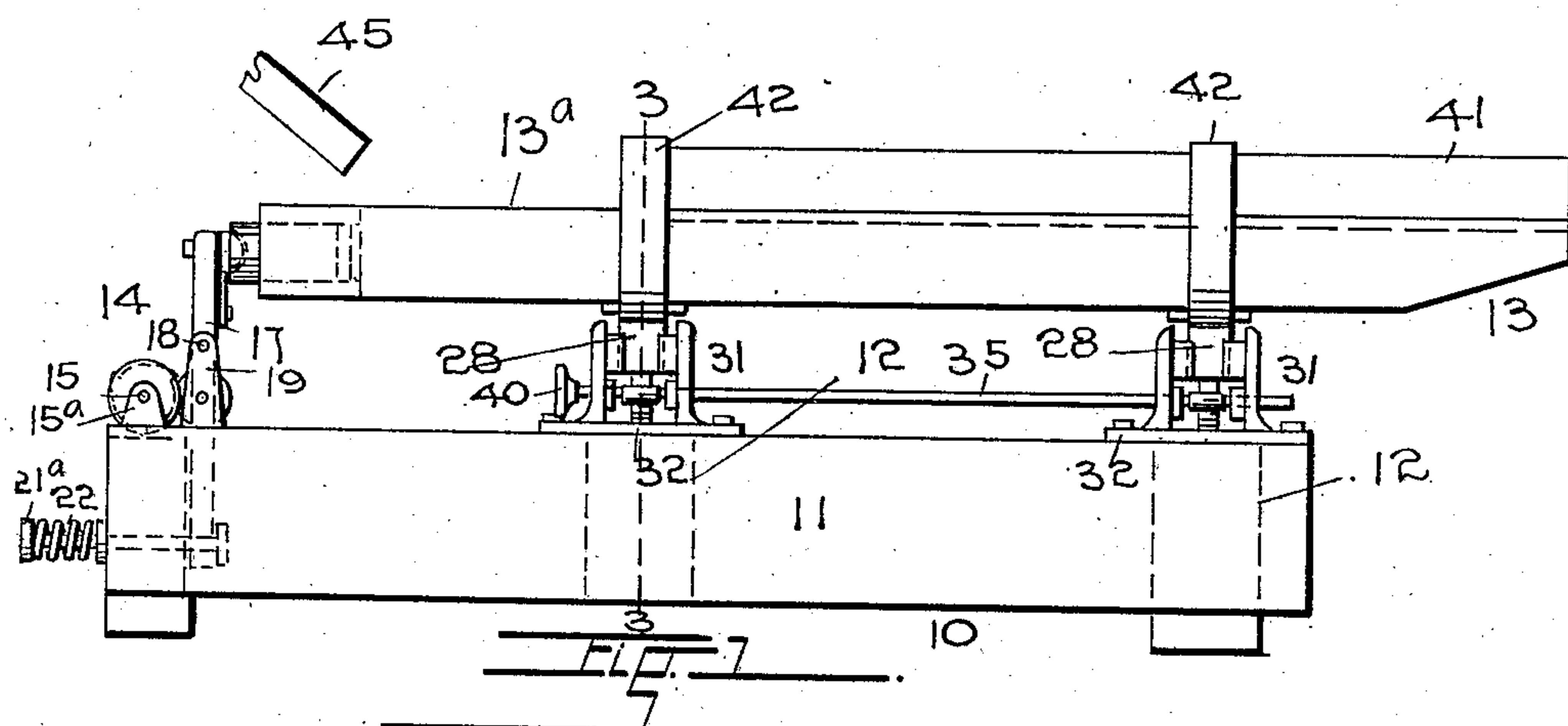
No. 845,396.

PATENTED FEB. 26, 1907.

M. CHRISTMANN.
ORE CONCENTRATOR.

APPLICATION FILED APR. 19, 1906.

3 SHEETS—SHEET 1.



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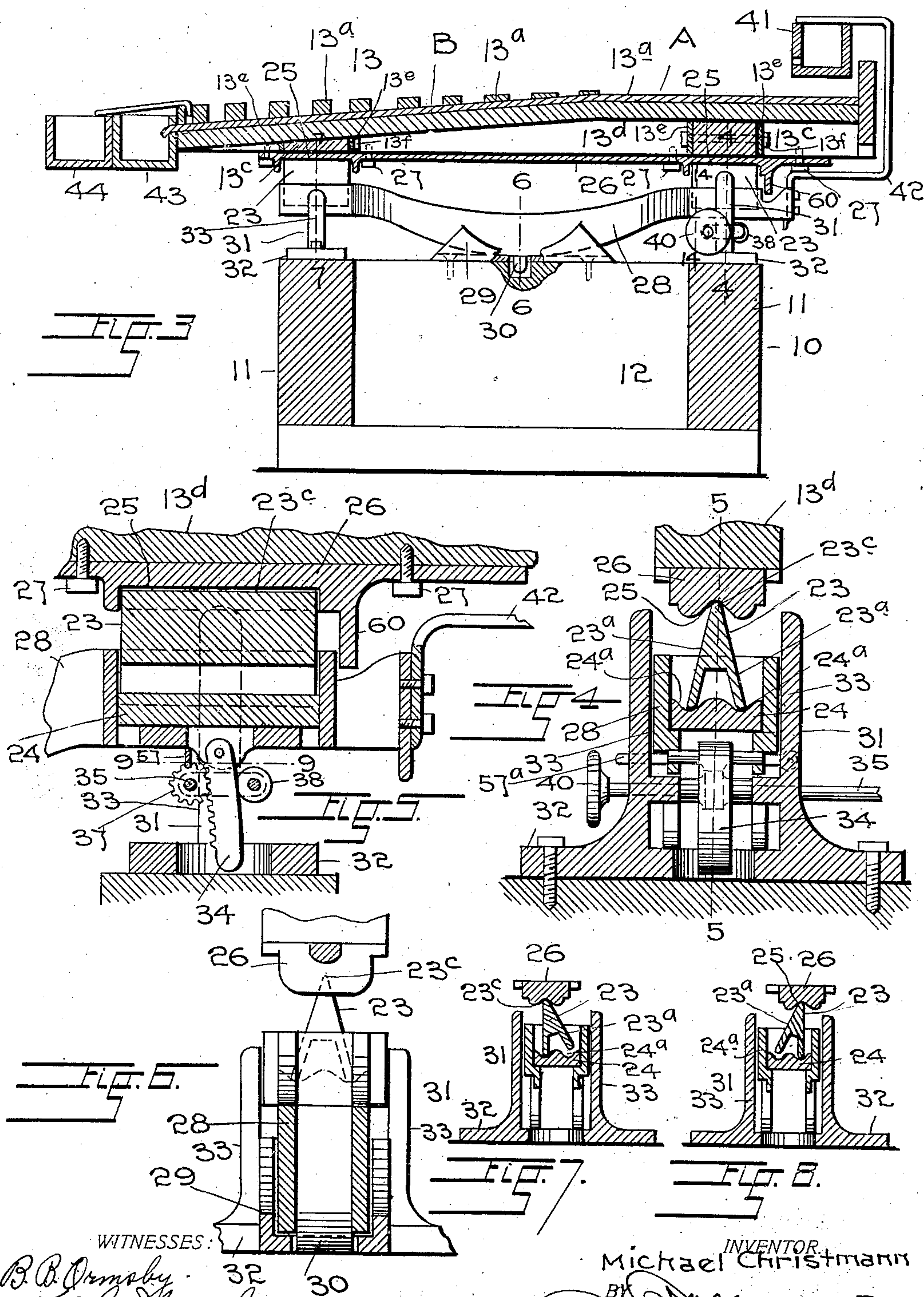
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3 SHEETS—SHEET 2.



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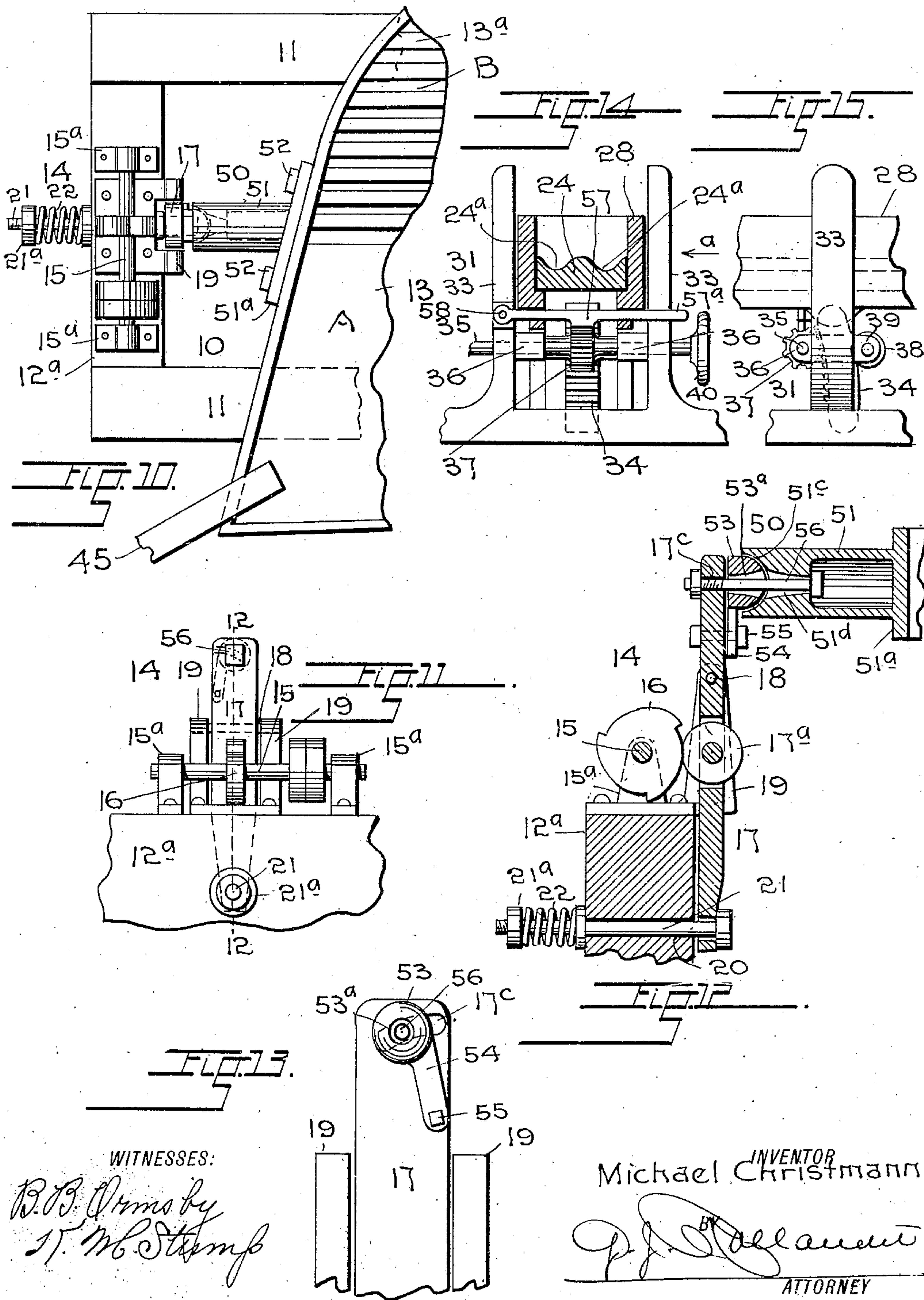
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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

MICHAEL CHRISTMANN, OF LEADVILLE, COLORADO.

ORE-CONCENTRATOR.

No. 845,396.

Specification of Letters Patent.

Patented Feb. 26, 1907.

Application filed April 19, 1906. Serial No. 312,729.

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.

This invention relates to improvements in ore-concentrating tables; and it resides more particularly in the means employed to support the table, which means, in cooperation with the mechanism employed to impart a longitudinal reciprocating movement to the table, are instrumental in effecting a clean separation of the values contained in the comminuted ore from the gangue.

An additional object of my invention is to provide means whereby the transverse inclination of the table may readily be adjusted and without interfering with the arrangement of the connecting parts of the operating mechanism or movement.

I attain these objects by the mechanism illustrated in the accompanying drawings, in the various views of which like parts are similarly designated, and in which—

Figure 1 represents a side elevation of the apparatus; Fig. 2, a plan view of the bed-frame and table-supports, the table, water, and discharge-troughs having been shown in broken lines; Fig. 3, an enlarged transverse section along a line 3 3, Fig. 1; Fig. 4, an enlarged section along a line 4 4, Fig. 3; Fig. 5, a section along a line 5 5, Fig. 4; Fig. 6, an enlarged section along a line 6 6, Fig. 3; Figs. 7 and 8, sections along a line 7 7, Fig. 3, showing opposite positions of the rockers; and Fig. 9, a horizontal section along a line 9 9, Fig. 5; Fig. 10, a fragmentary plan view of the movement end of the frame and the table; Fig. 11, a front elevation of the movement; Fig. 12, an enlarged vertical section taken along a line 12 12, Fig. 11; Fig. 13, an enlarged view of the upper extremity of the operating-lever; Fig. 14, an enlarged section along a line 14 14, Fig. 3; and Fig. 15, an elevation looking from a point *a*, Fig. 14, the land-wheel omitted.

Referring to the drawings, 10 represents a suitable stationary bed or base-frame comprising the longitudinal beams 11 and the cross-timbers 12, securely bolted together to form an adequate support for the table and operating mechanism.

13 is the concentrator-table mounted in

superposed relation to the base-frame and comprising the preferably riffled deck 13^a, the supporting-girders 13^c, and cross-timbers 13^d. A longitudinal vibrating or reciprocating movement is imparted to the table by means of a suitable mechanism 14, mounted at the extreme end of the bed and comprising a horizontal shaft 15, revolvably mounted in journal-boxes 15^a and provided with a multiple cam or wiper wheel 16, which in practice engages an antifriction-wheel 17^a in the lower arm of a vertically-disposed lever 17, fulcrumed at 18 in a standard 19. The extremity of the upper arm of lever 17 is connected with the adjacent end of the table by a ball-and-socket joint 50, the female member 51 of which has a flange 51^a, which is secured to the end of the table by means of bolts 52. The male member 53 is semispherical in shape and adapted to occupy a similarly-shaped recess 51^c in member 51. It is provided with an integral downwardly-extending arm 54, the lower extremity of which is pivotally secured to the upper arm of lever 17 by a bolt 55. The two members are furthermore secured to the lever by a bolt 56, which extends through a curved slot 17^c in the upper extremity of the lever and through central bores 53^a and 51^d, which, being diametrically larger than the bolt, permit lateral movement of the respective members 53 and 51.

The extreme end of the lower arm of lever 17 is provided with a headed rod 21, which extends through an aperture 20 in the end cross-timber 12^a of the frame. A nut 21^a on the outer extremity of the rod engages a spiral spring 22, the other end of which is in contact with the surface of timber 12^a and which, being compressed during forward movement of the table, is instrumental in returning it to its normal position.

Table 13 is movably supported on two pairs of normally vertically extending independent wedge-shaped rockers 23, the lower extremities of the downwardly-diverging sides 23^a of which form feet which normally rest in individual V-shaped seats 24^a in dies 24, mounted on the stationary frame, while their vertices 23^c occupy correspondingly-shaped seats 25 in the opposite extremities of metal bars 26, which are transversely secured along the under side of the table by means of bolts 27.

Dies 24 are preferably located in the outer extremities of two parallel curved cross-bars

28, pivotally mounted transversely of frame 10 in chairs 29, which are rigidly secured on the cross-timbers 12. Arms 28 are furthermore provided with downwardly-extending
 5 central lugs 30, which in practice project loosely through openings in the bottom of chairs 29 and insure against the former's lateral and longitudinal displacement. Bars 28 being thus pivotally mounted in the
 10 chairs afford means to adjust the transverse inclination of the superposed table. Their outer extremities are during their arcuate movement guided in standards 31, secured to the stationary frame 10 and each composed
 15 of a bed-plate 32 and the therewith integral guides 33, in between which the die-bearing extremities of the curved arms extend.

The transverse inclination of the table is varied by raising or depressing the corresponding
 20 extremities of the two bars 28, which to this end are provided with pivotally-secured depending segmental racks 34. A longitudinally-disposed shaft 35 is rotatably mounted in ears 36 on the corresponding
 25 standards and is provided with pinions 37, which engage the toothed edges of the racks. Guide-rollers 38, rotatably mounted in ears 39 on guides 33 opposite the pinions, are intended to insure the constant engagement of
 30 the latter with the racks. When shaft 35 is rotated, which may be accomplished by means of a hand-wheel 40, pinions 37, engaging the racks, will cause the curved arms to move about their pivots and the transverse
 35 inclination of the superposed table is changed in consequence.

Gravity-impelled dogs 57, pivotally secured at 58 to one of the guides 33, normally engage the teeth of the pinions 37 to maintain the table in the inclined position. They
 40 are preferably provided with outwardly-extending handles 57^a to facilitate their being thrown out of engagement while the inclination of the table is being adjusted.

41 designates a foraminated water-trough arranged to supply water along the upper surface of the table and secured to the adjacent extremities of the curved arms 28 by means of bent bars 42, while troughs 43 and
 50 44, located along the opposite or discharge side of the table, are intended to receive the gangue and silica discharged therefrom.

The deck of table 13 is preferably longitudinally divided into a plain portion A and a
 55 longitudinally-riffled portion B, while its end adjacent to the movement is inclined to direct the material fed onto the plain portion A through a suitable trough 45 toward the discharge side. The table is held against lateral displacement by means of stops 60 on
 60 bars 26, which engage adjacent portions of arms 28. The table may be strengthened by means of metal plates 13^e placed alongside the girders 13^c and secured thereto by bolts
 65 13^f.

Having thus described the mechanical construction of the device, its operation is as follows: The pulp is fed onto the upper or movement end of the table through a suitable trough or spout 45 and the matter separated by reason of the vibratory movement
 70 of the table, which causes the heaviest and most valuable particles of ore to move along the deck to be discharged at its lower end, while the lighter matter, aided by the water
 75 supplied from trough 41, will flow over the riffled portion of the table, the riffles on which progressively catch the heavier particles and guide them to the discharge end of the table, while the lighter matter or gangue
 80 falls into launder 43. During the reciprocating movement of the table imparted thereto by the operating mechanism 14 the oscillating wedge-shaped rockers 23 will alternately engage the seats 24^a in dies 24, as
 85 illustrated in Figs. 7 and 8. This action not only imparts an arcuate movement to the table, but each time one of the feet of the rockers comes in contact with its individual seat in the corresponding dies 24 a violent
 90 concussion is imparted to the deck and the matter deposited thereon, with the result that the pulp, besides being subject to the longitudinal arcuate vibratory motion of the table, is furthermore influenced by a rapid
 95 vertical concussive action, which constraining the material to move upwardly will cause the fine values, which under ordinary circumstances flow away on top of the gangue, to precipitate and be saved in consequence.
 100 The two motions combined will thus greatly increase the efficiency of the apparatus and result in a perfect and clean separation of the values from the matrix.

The means for adjusting the transverse inclination of the table adapts it to treat varying kinds of ore, and the movable connection between the table and the lever 17 of the movement will by automatically adjusting
 105 itself to the varying position of the table prevent strain and consequent breakage of the lever and warping of the deck.

Having thus described my invention, what I claim is—

1. The combination with a stationary bed
 115 or base-frame and a concentrator deck or table having a longitudinal, vibratory movement thereon, of wedge-shaped rockers interposed between the table and the frame, their vertices engaging the former while the
 120 extremities of their diverging sides engage seats on the stationary frame said rockers being independent of both the stationary frame and the concentrator-deck.

2. The combination with a stationary
 125 frame and a concentrator table or deck movably mounted thereon, of a plurality of interposed rockers of inverted-V shape engaging the latter and having a recess at the lower
 130 ends forming two feet arranged to alter-

nately engage the frame during longitudinal reciprocating movement of the table said rockers being independent of both the stationary frame and the concentrator-deck.

5 3. The combination with a stationary frame, a concentrator deck or table movably mounted thereon, said deck or table having
10 recesses on its bottom forming seats, and the frame-carrying recesses also forming seats, said recesses on the frame being arranged in
pairs and wedge-shaped rockers each having
a pair of feet at its wide end which engage in
a pair of recesses on the frame while the nar-
15 row end of said rocker engages with a recess on the table said rockers being independent
of both the stationary frame and the concentrator-deck.

4. The combination with a stationary
20 frame and a concentrator-table having a longitudinal movement thereon of curved arms pivotally mounted transversely of the frame
each of said arms having a pair of recesses at
the outer end thereof and a wedge-shaped
25 rocker between the outer end of each arm and the table, each rocker having a pair of
feet at its wide end, engaging with the pair of
recesses and the upper narrow end of the
rocker engaging with the bottom of the table.

5. The combination with a stationary
30 frame and a concentrator-table, of curved arms pivotally mounted on the frame, a die mounted in the outer end of each arm, each
die having a pair of recesses therein, trans-
verse bars secured to the bottom of the ta-
35 ble, each of said bars having a recess at its

outer end, and wedge-shaped rockers each
having feet at its lower wide end engaging
with the pair of recesses in the die and its nar-
row upper end engaging with the recess in the
bar.

6. The combination with a stationary
40 frame having recesses therein, chairs on said frame, curved arms resting in said chairs and
having projections engaging with the re-
cesses to hold the arms in place, rockers 45
mounted at the extremities of the arms, a concentrator-table mounted on said rockers
an upright standard on the frame on each
side of the extremities of the arms to guide
said arms and means for giving said table a 50
longitudinal reciprocatory movement.

7. The combination with a stationary
frame and a concentrator deck or table ad-
justably and movably mounted thereon, of
a vertical lever fulcrumed on the frame, a 55
shaft having a multiple cam engaging the lower arm of the lever, a socketed projection
on the table, an arm pivotally mounted on
the upper arm of the lever and having a
semispherical head arranged to occupy the 60
socket in the projection, and a bolt extend-
ing through central apertures in the head and
in the projection and through a segmental
slot in the lever.

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

MICHAEL CHRISTMANN.

Witnesses:

A. G. VERHOFSTAD,
LLOYD HARRISON.