

W. GRUMMEL.

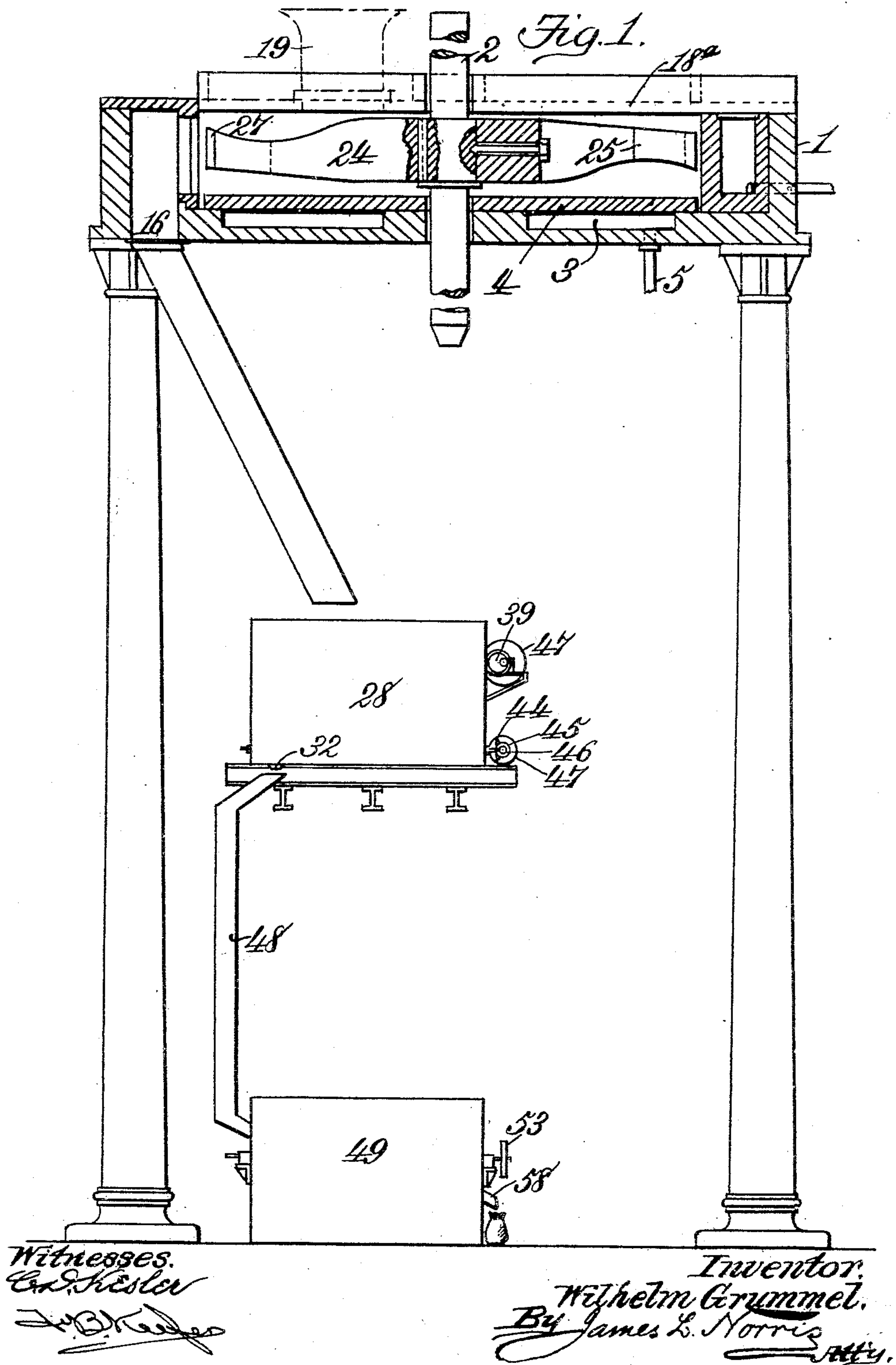
SEPARATOR.

APPLICATION FILED FEB. 19, 1908.

964,244.

Patented July 12, 1910.

3 SHEETS—SHEET 1.

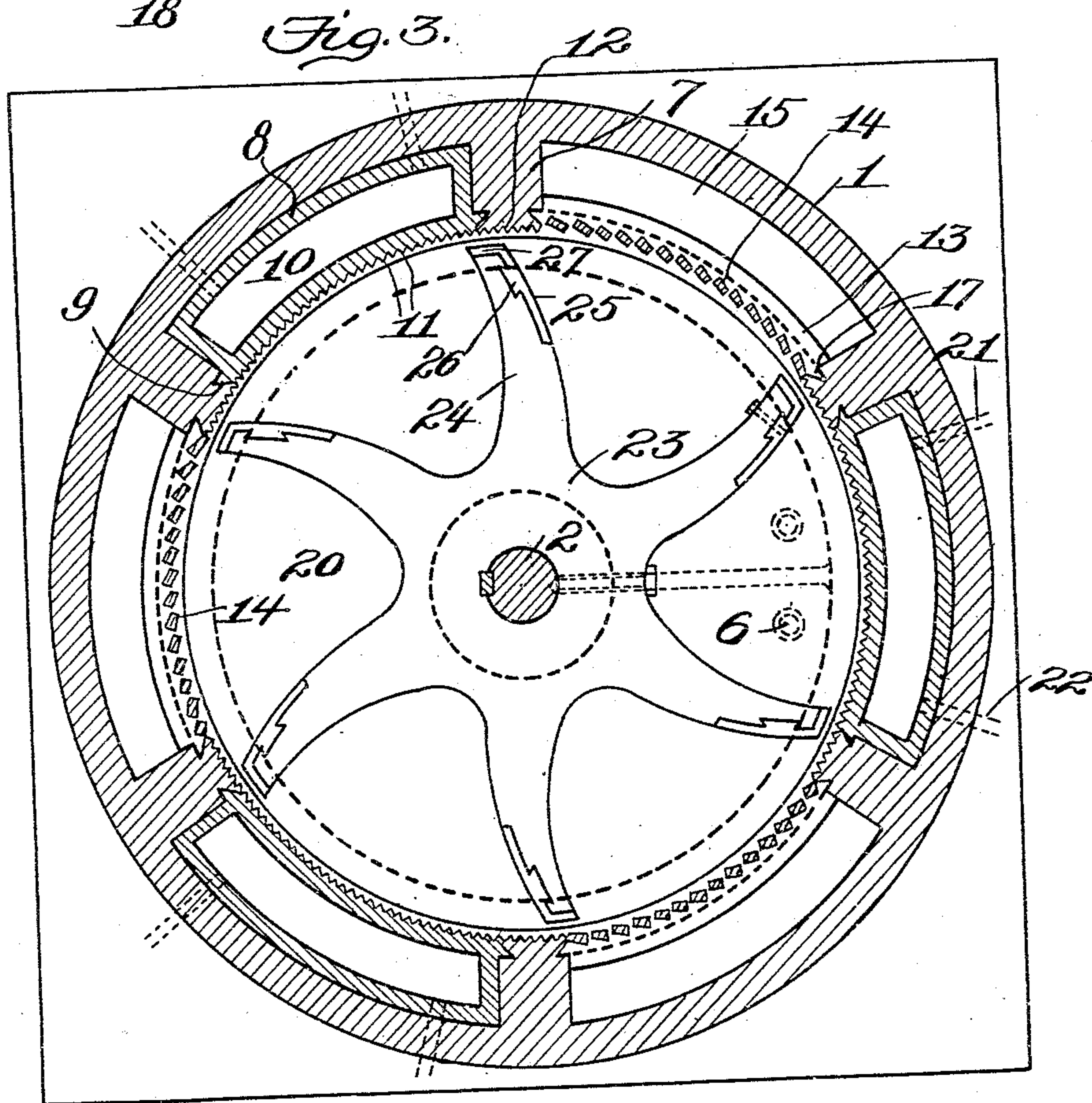
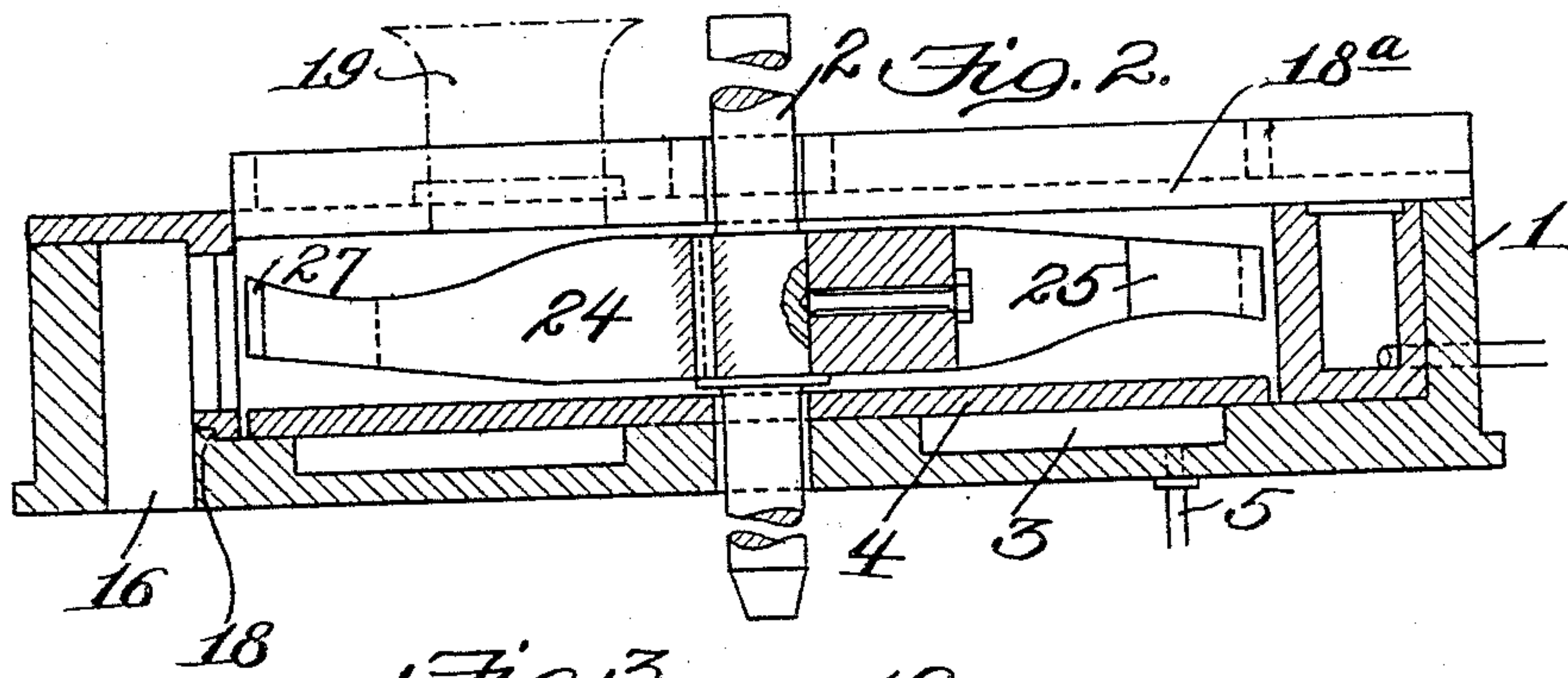


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3 SHEETS—SHEET 2.

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3 SHEETS—SHEET 3.

Fig. 4.

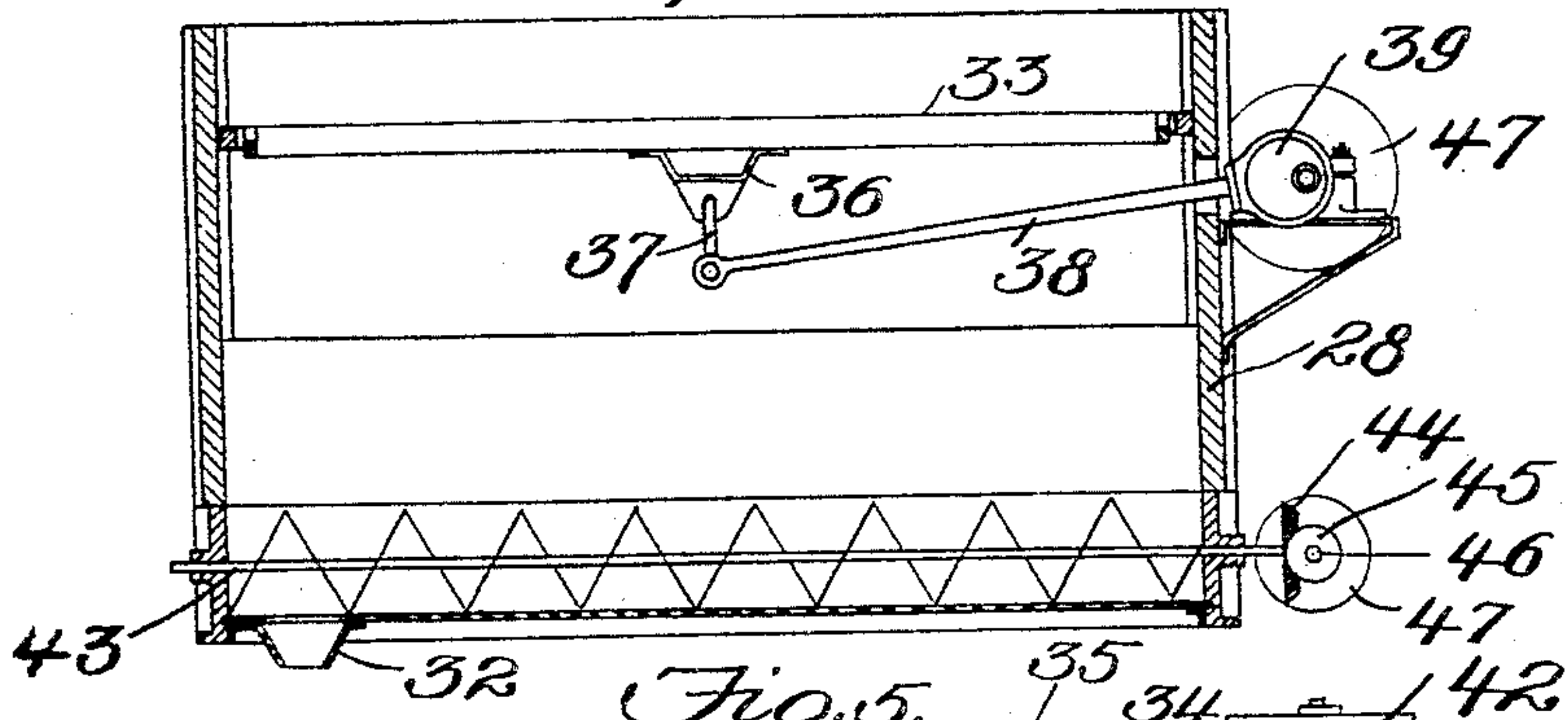


Fig. 5.

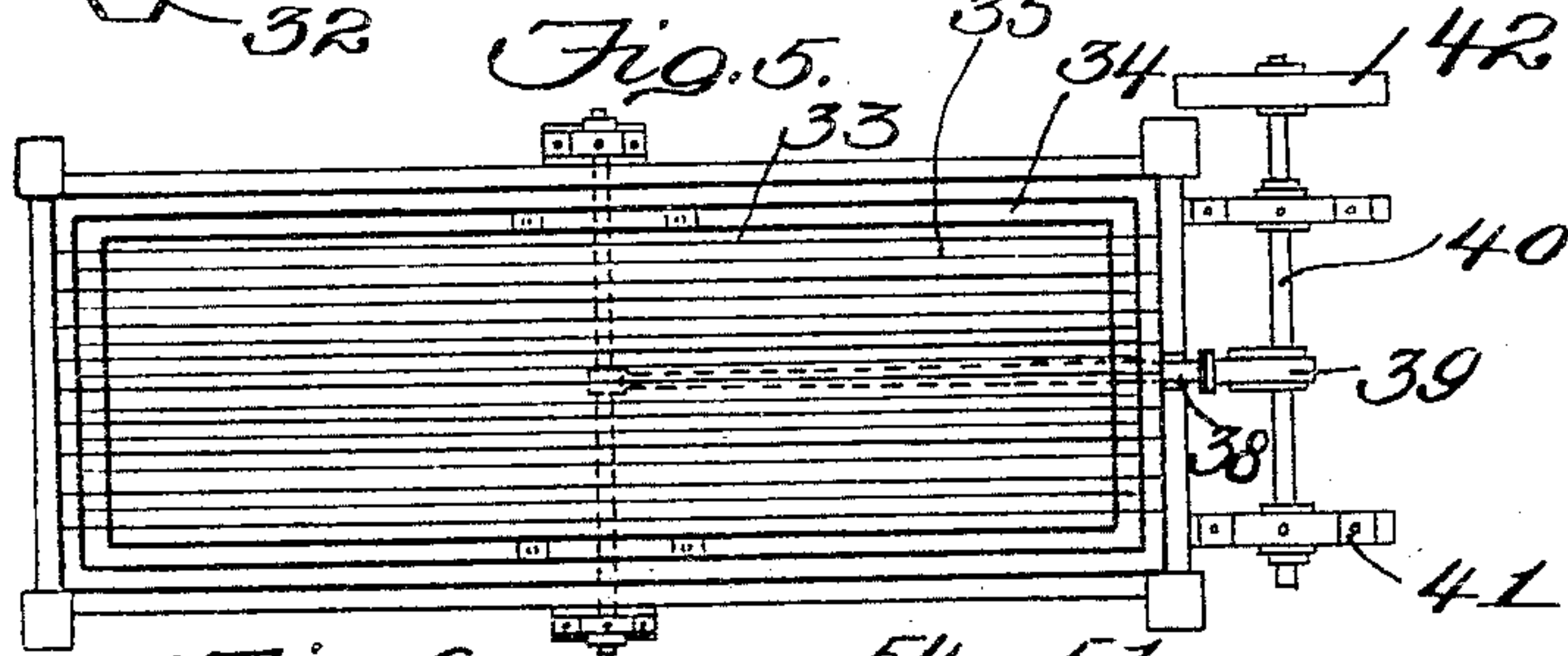


Fig. 6.

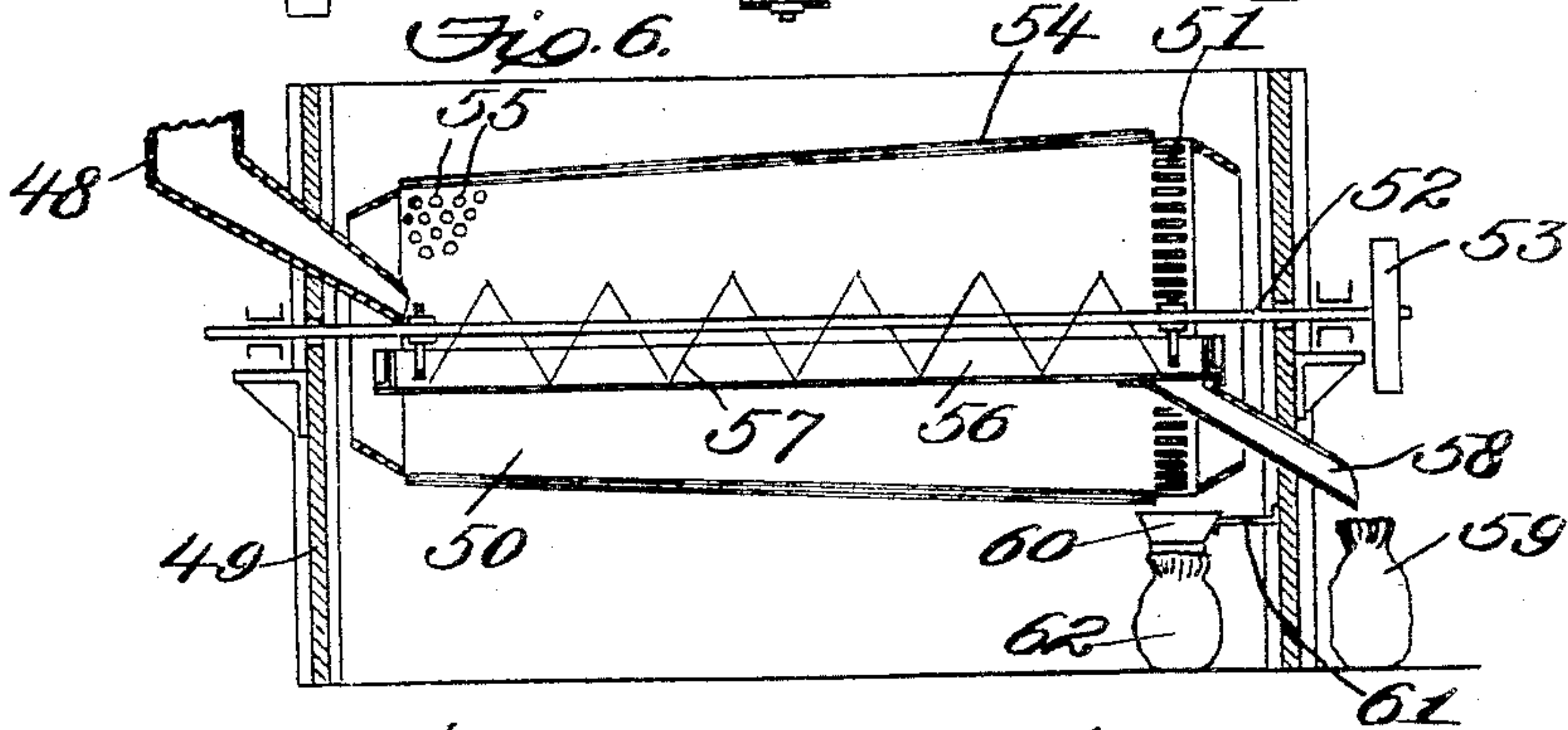


Fig. 7.

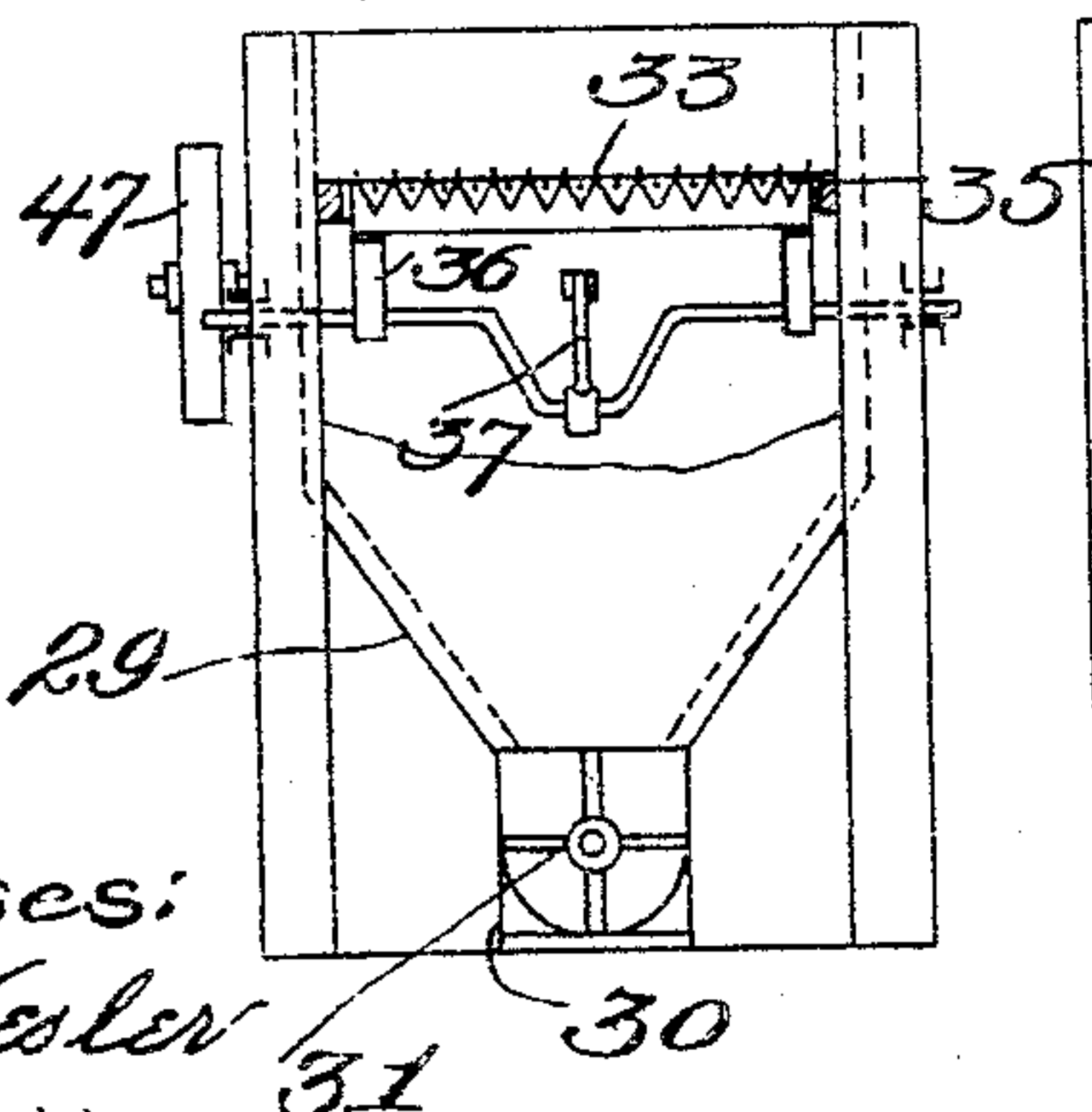
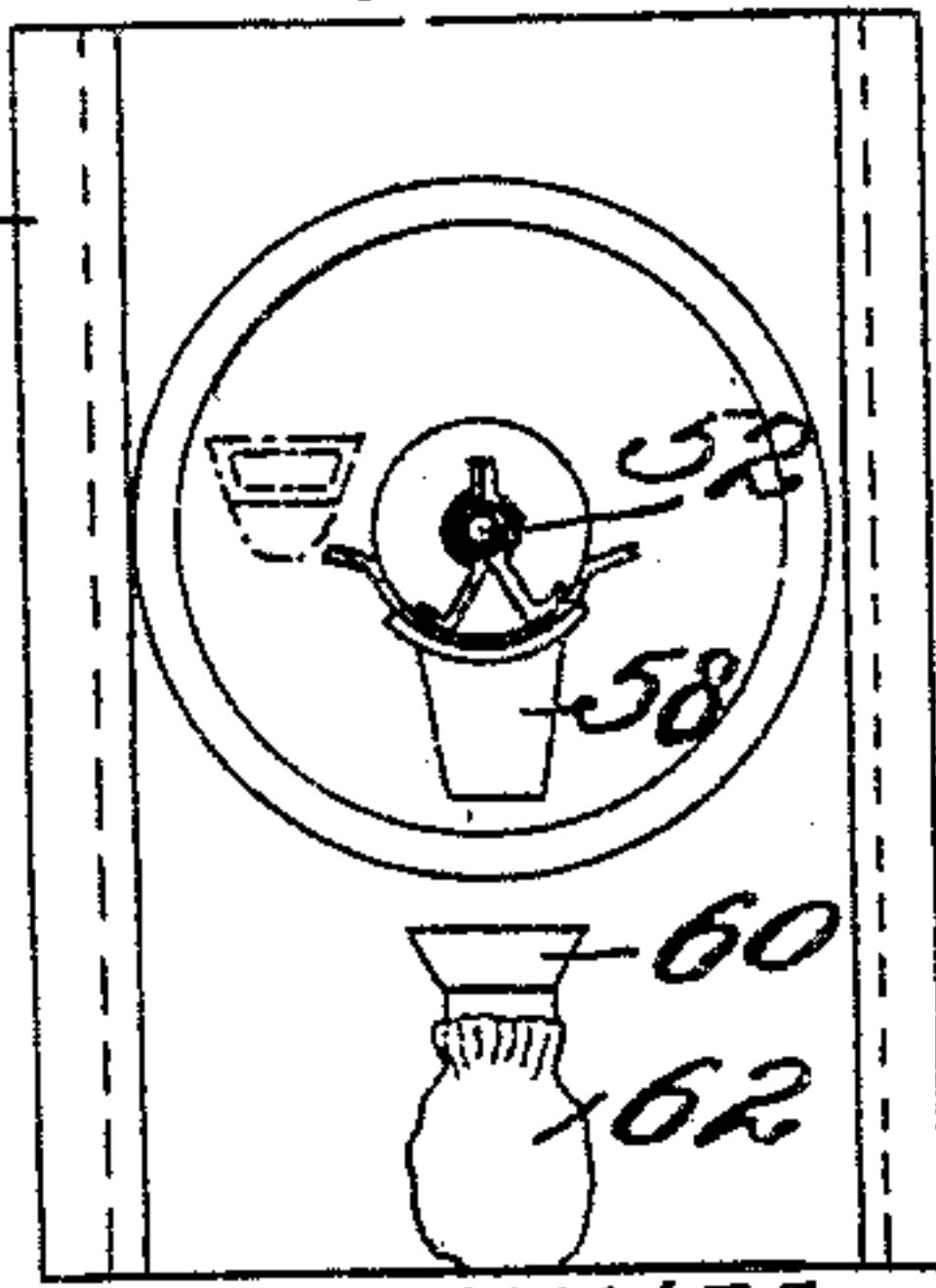


Fig. 8.



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Specification of Letters Patent.

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Application filed February 19, 1908. Serial No. 416,682.

To all whom it may concern:

Be it known that I, WILHELM GRUMMEL, a subject of the Emperor of Germany, residing at Behrenbostel, near Hanover, Germany, have invented certain new and useful Improvements in Separators, of which the following is a specification.

This invention relates to "separators," and the object thereof is to provide an apparatus, in a manner as hereinafter set forth, particularly adapted for separating vulcanized india rubber from fibrous and other materials combined therewith and for other purposes for which the apparatus is found applicable.

Further objects of the invention are to provide a separator for the purpose set forth which shall be comparatively simple in construction, strong, durable, efficient in its use, readily set up, conveniently operated and inexpensive to build.

With the foregoing and other objects in view the invention consists of the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown the preferred embodiment of a separator in accordance with this invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawings, wherein like characters denote corresponding parts throughout the several views Figure 1 is an elevation partly in section of a separator in accordance with this invention; Fig. 2 is a vertical sectional view of the disintegrator mechanism; Fig. 3 is a sectional plan of the disintegrator mechanism; Fig. 4 is a longitudinal sectional view of the primary sorting mechanism; Fig. 5 is a sectional plan thereof; Fig. 6 is a longitudinal sectional view of the secondary sorting mechanism; Fig. 7 is an end view of Fig. 4, and, Fig. 8 is an end view of Fig. 6.

A separator for the purpose set forth and in accordance with this invention embodies a disintegrating mechanism, a primary sorting mechanism and a secondary sorting mechanism, the primary sorting mechanism adapted to receive the material operated upon from the disintegrator mechanism, and the secondary sorting mechanism being adapted to receive the sorting material from the primary sorting mechanism.

With the secondary sorting mechanism associates a pair of receptacles to which is conveyed the sorted materials. The disintegrator mechanism comprises a casing 1, through which extends a vertical shaft 2 connected with any suitable driving mechanism. The casing 1 has the bottom thereof hollowed out, as at 3, forming a cooling medium-receiving chamber which is closed through the medium of a plate 4. A cooling medium supply pipe 5 communicates with the chamber 3 and the said chamber is provided with an outlet 6 whereby a circulation of the cooling medium through the chamber 3 can be had. The casing 1 is furthermore provided with a series of inwardly-extending partitions 7 having the inner ends formed with dove-tail grooves extending in a vertical manner. By way of example six partitions are shown, but it is evident that this number can be increased or diminished as desired. Between every alternate pair of partitions 7 is positioned a casing 8 having dove-tail tongues 9 for engagement in the dove-tail grooves in the partitions. Each of the casings 8 constitutes a cooling medium-receiving chamber 10 and the outer face of the inner wall of each of said casings 8 is toothed as at 11. The partitions 7 have their inner faces toothed as at 12 and which form a continuation of the teeth 11. Those partitions 7 which do not have positioned between them a casing 8 have interposed there-between at their inner ends a segment-shaped plate 13 carrying vertical circumferentially spaced bars 14 which are disposed at an inclination with respect to each other and constitute a grating and form the inner wall of a chamber 15 which has an outlet through the bottom of the casing 1 as at 16. The segment-shaped plates 13 have dove-tail tongues 17 for engagement in the dove-tail grooves of the partitions 7 and the said plates 13 are shouldered for engagement with the shoulders 18 formed upon the bottom of a casing 1. The latter is also provided with a cover plate 18^a through which the shaft 2 extends and which is formed with a hopper 19 communicating with the chamber 20 formed by the casing 1. The material to be treated is fed through the hopper 19 to the chamber 1. Circulation of a cooling medium through each of the chambers 10 is had by the inlet pipe 21 and outlet pipe 22. These pipes

extend through the casings 1 and 8 and open into the chambers 10.

Mounted upon the shaft 2 so as to rotate therewith is a member 23 provided with a plurality of arms 24 each having its terminus provided with a removable cutter 25, these cutters being removably connected to the arms 24 and by way of example the cutters are formed with dove-tail tongues 26 engaging in dove-tail grooves formed in the arms 24. The cutters also overlap the ends of the arms as at 27 and associate during the disintegrating operation with the teeth 11 and 12.

In connection with the disintegrating operation it will be said that the material having been supplied to the chamber 20 and the member 23 driven through the medium of the rotatable shaft 2, the material is caught by the arms 24 of said member 23 and thrown against the teeth 11 and 12, these latter, in connection with the cutters 25 tearing the material into shreds. During the operation of the member 23 the shredded material will be forced through the gratings into the chambers 15 and from there discharged into the primary sorting mechanism, this latter being positioned in such relation with respect to the disintegrating mechanism that the disintegrating material will be discharged from the chambers 15 through the outlet 16 and into the primary sorting mechanism.

The primary sorting mechanism comprises a receptacle 28 having an inclined bottom 29 opening into a casing 30 in which is arranged a spiral conveyer 31. The casing 30 at one end is formed with an outlet 32 depending below the receptacle 28. Arranged within the receptacle 28 in proximity to the top thereof is a frame to which is connected a series of longitudinally-extending wires 33 which are suitably spaced apart and fixed at their ends to the frame, the latter being secured to the end walls of casing 28. The wires 33 constitute a sieve. Positioned below the wires 33 is a vibratory frame 34 carrying a series of longitudinally-extending wires 35 which are alternately disposed with respect to the wires 33. The frame 34 has depending therefrom a pair of hangers 36 which are connected to a crank shaft 37 journaled in the side walls of the receptacle 28. The crank shaft 37 is actuated through the medium of an eccentric rod 38 connected to an eccentric 39 carried by an operating shaft 40 which is journaled in bearings 41 projecting from one end wall of the receptacle 28. A drive pulley 42 is mounted upon one end of the shaft 40. One of the end walls of the receptacle 28 is formed with an opening through which extends the rod 38. The shaft of the conveyer 31 which is mounted in the casing 30 is indicated by the reference character 43 and is journaled in the

end walls of the receptacle 28. One end of the shaft 43 projects from the receptacle 28 and carries a bevel gear 44 meshing with a bevel pinion 45 fixed on a shaft 46, the latter carrying a driving pulley 47 therefor. The disintegrated material from the disintegrating mechanism is fed upon the wires 33 and in connection with the wires 35 which vibrate, the material is sorted. The superposing of the two series of wires and the arrangement of one series of wires in an alternate manner with respect to the wires of the other series overcomes the clogging of the material and furthermore as one series of wires cuts against the other series of wires the fibers always adhere to one wire only, thereby causing the comminuted rubber to drop through entirely, none of it being left behind in the fibers. A further advantage of positioning the two series of wires in a manner as stated causes the material to form itself in small rolls and thus prevents the rubber from dropping out of the wool or fibers. After the comminuted rubber passes through the seive or between the two series of wires it falls into the conveyer 31 where it is conducted to the outlet 32 and from there discharged into the secondary sorting mechanism.

The secondary sorting mechanism embodies a conducting chute 48 for the comminuted rubber and which has its upper end positioned below the outlet 32 and its lower end extending through one wall of the receptacle 49 and opening into a perforated conical drum 50 having its larger end provided with a circumferentially-extending series of enlarged openings or slots 51. The drum 50 is fixed to a shaft 52 which extends through the end walls of the receptacle 49 and is mounted in suitable bearings. One end of the shaft 52 carries a drive pulley 53 therefor. The operation of the shaft 52 revolves the drum 50. The drum 50 is inclosed by a fibrous covering, preferably a covering of leather. The leather covering which is indicated by the reference character 54 is perforated, the perforations registering with the perforations 55 in the drum. Extending longitudinally of the drum 50 is a conduit 56 in which operates a screw conveyer 57 which is actuated through the medium of the shaft 52. Projecting from one end of the conduit 56 and extending through one end wall of the receptacle 49 is a discharge spout 58 which has its outer end positioned over a receptacle 59. Arranged below the openings 51 of the drum 50 is a funnel 60 supported by the bracket 61, the funnel 60 communicating with a receptacle 62. It will be assumed that the comminuted rubber from the primary sorting mechanism has been discharged into the drum 50. On the rotation of the drum the heavy particles are thrown against the wall of the drum and

pass out through the openings 55 or 51. The light particles that may require further treatment are carried up and fall into the conveyer 57 and are delivered by the spout 58 into the receptacle 59. The larger rubber particles remain in the drum and slide toward the end having the large openings 51 which are not inclosed by the covering 54, and drop through the said openings 51 through the funnel 60 and into the receptacle 62 in order to undergo a similar further treatment.

What I claim is—

1. A separator of the class described comprising a disintegrating mechanism for dividing the material, a primary sorting mechanism connected to receive the divided material from the disintegrating mechanism and involving a vibratory member operative upon the material from the disintegrating mechanism, and a secondary sorting mechanism connected to receive the sorted material from the primary sorting mechanism and involving a conical perforated drum having openings at its larger end through which a portion of the sorted material is discharged and containing within it a conveyer for discharging the remainder of the sorted material.

2. A separator comprising a disintegrating mechanism embodying a casing provided with a plurality of series of teeth, a rotatable member arranged therein and having a plurality of arms provided with cutters associating with said teeth, said casing further provided with a plurality of chambers to receive the disintegrated material and having outlets, a grating constituting the inner walls of each of said chambers, said gratings being alternately disposed with respect to said plurality of series of teeth, and receiving the material from the respective series of teeth.

3. A separator comprising a disintegrating mechanism embodying a casing provided with a plurality of series of teeth, a rotatable member arranged therein and having a plurality of arms provided with cutters associating with said teeth, said casing further provided with a plurality of chambers having outlets, a grating constituting the inner wall of each of said chambers, said gratings alternately disposed with respect to said plurality of series of teeth, combined with a sorting mechanism arranged in operative relation with respect to said disintegrating mechanism and embodying a pair of wire frames, one moving against the other, and a conveying means for the material which passes through said frames.

4. A separator comprising a disintegrating mechanism embodying a casing provided with a plurality of series of teeth, a rotatable member arranged therein and having a plurality of arms provided with cut-

ters associating with said teeth, said casing further provided with a plurality of chambers having outlets, a grating constituting the inner wall of each of said chambers, said gratings alternately disposed with respect to said plurality of series of teeth, combined with a sorting mechanism arranged in operative relation with respect to said disintegrating mechanism and embodying a pair of wire frames, one moving against the other, a conveying means for the material which passes through said frame, a secondary sorting mechanism arranged in operative relation with respect to said primary sorting mechanism and embodying a perforated conical drum provided with a perforated fibrous covering and an elongated opening at one side of the covering, a conducting chute, a discharge spout therefor, and a conveyer in said conducting chute.

5. A separator of the character described comprising a primary sorting apparatus and a secondary sorting and separating apparatus embodying a conical perforated drum having a perforated fibrous covering of less length than the length of the drum, said drum further provided toward its larger end with elongated circumferential openings at one end thereof and free of said covering.

6. A separator of the character described comprising a primary sorting apparatus and a secondary sorting apparatus embodying a conical perforated drum having a perforated fibrous covering of less length than the length of the drum, said drum further provided with elongated circumferential openings at one end thereof and free of said covering, a conduit arranged within the drum and having a discharge spout, and a conveyer mounted in said conduit.

7. A separator comprising a disintegrating apparatus consisting of a casing provided with a plurality of material-receiving chambers and a plurality of cooling medium-receiving chambers, said cooling medium-receiving chambers alternately disposed with respect to said material-receiving chambers and having the inner face of the inner wall thereof toothed, a plurality of gratings constituting the inner walls of said material-receiving chambers, each of these latter chambers having an outlet, and a rotatable member mounted in said casing and provided with a plurality of knives associating with said teeth.

8. A separator comprising a disintegrating apparatus consisting of a casing provided with a plurality of material-receiving chambers and a plurality of cooling medium-receiving chambers, said cooling medium-receiving chambers alternately disposed with respect to said material-receiving chambers and having the inner face of the inner wall thereof toothed, a plural-

ity of gratings constituting the inner walls
of said material-receiving chambers, each of
these latter chambers having an outlet, and
a rotatable member mounted in said casing
5 and provided with a plurality of knives as-
sociating with said teeth, combined with a
sorting mechanism.

9. A separator comprising a disintegrat-
ing apparatus consisting of a casing pro-
10 vided with a plurality of material-receiving
chambers and a plurality of cooling me-
dium-receiving chambers alternately dis-
posed with respect to said material-receiving
chambers and having the inner face of the
15 inner wall thereof toothed, a plurality of
gratings constituting the inner walls of said

material-receiving chambers, each of these
latter chambers having an outlet, and a ro-
tatable member mounted in said casing and
provided with a plurality of knives associ- 20
ating with said teeth, combined with a
primary sorting mechanism, and a second-
ary sorting mechanism embodying means
for separating the material.

In testimony whereof I have hereunto set 25
my hand in presence of two subscribing wit-
nesses.

WILHELM GRUMMEL.

Witnesses:

FRIEDRICH MILIUS,
ROBERT V. BÜLOW.