

S. M. SCHINDEL.
GRAIN SEPARATOR.
APPLICATION FILED OCT. 10, 1910.

994,659.

Patented June 6, 1911

3 SHEETS-SHEET 1.

Fig. 1.

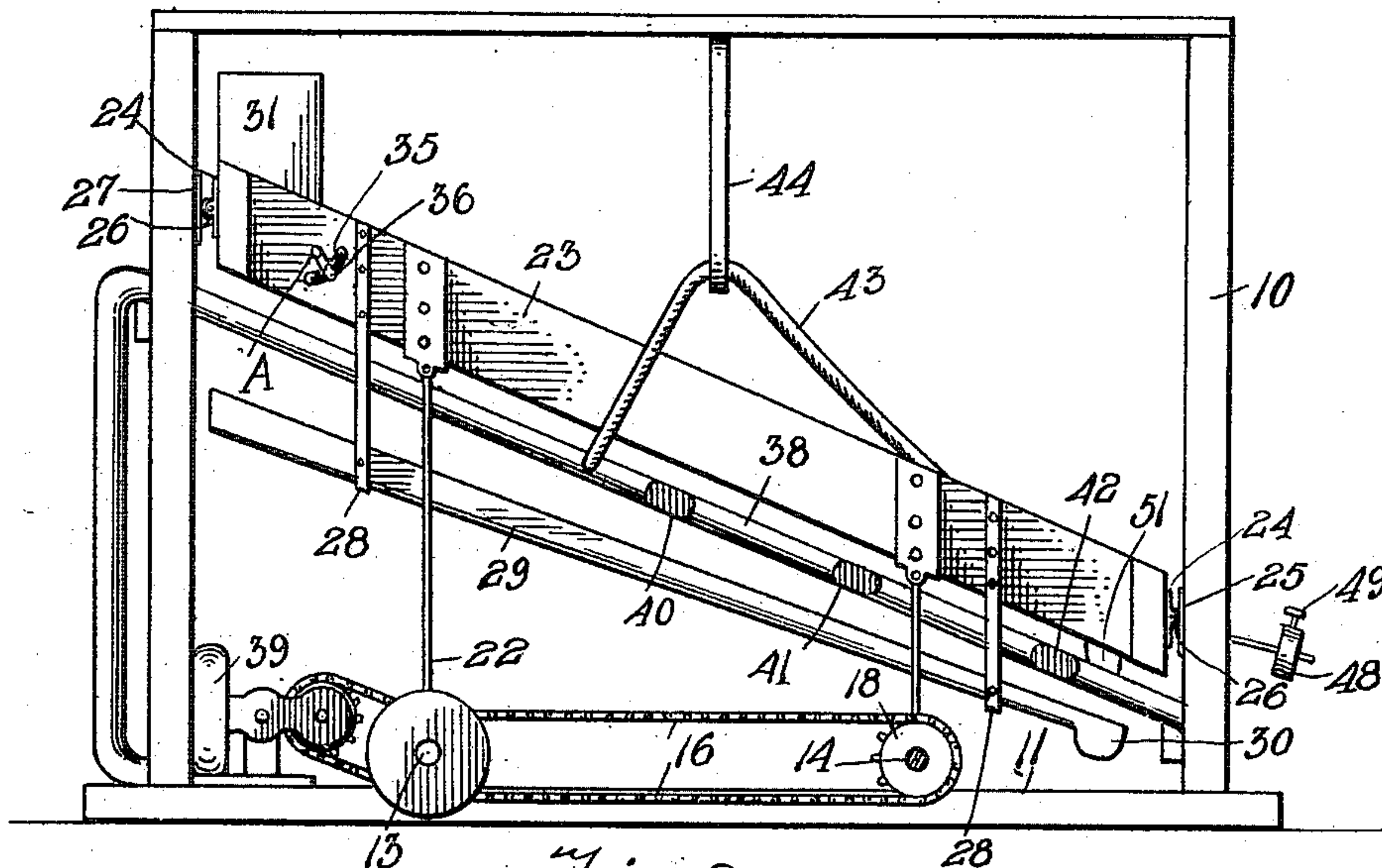
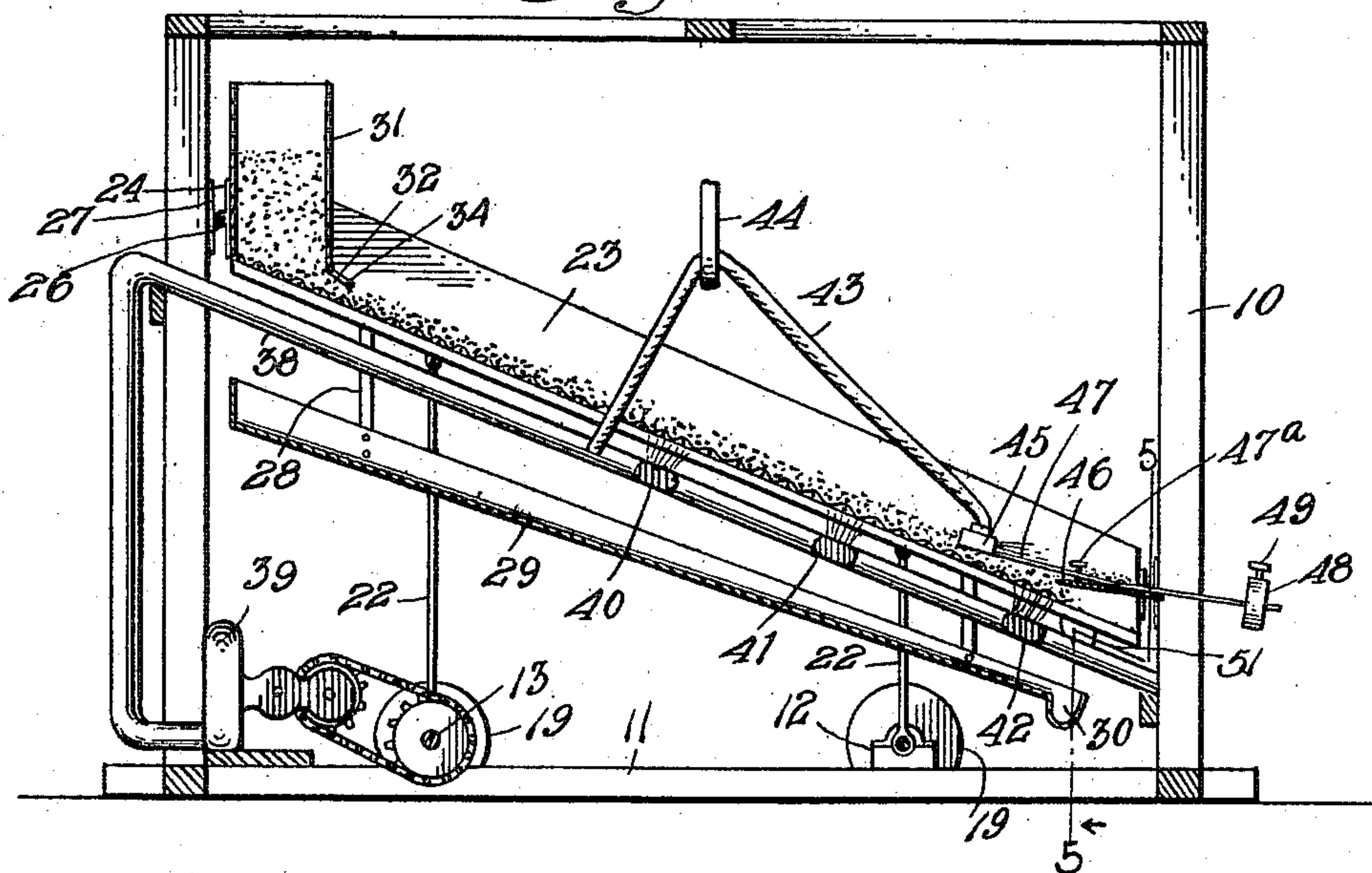


Fig. 2.



WITNESSES

G. M. Spring
H. C. Barkley

INVENTOR

Samuel Milford Schindel
by Frank Schlemmer,
Attorney

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3 SHEETS—SHEET 2.

Fig. 3.

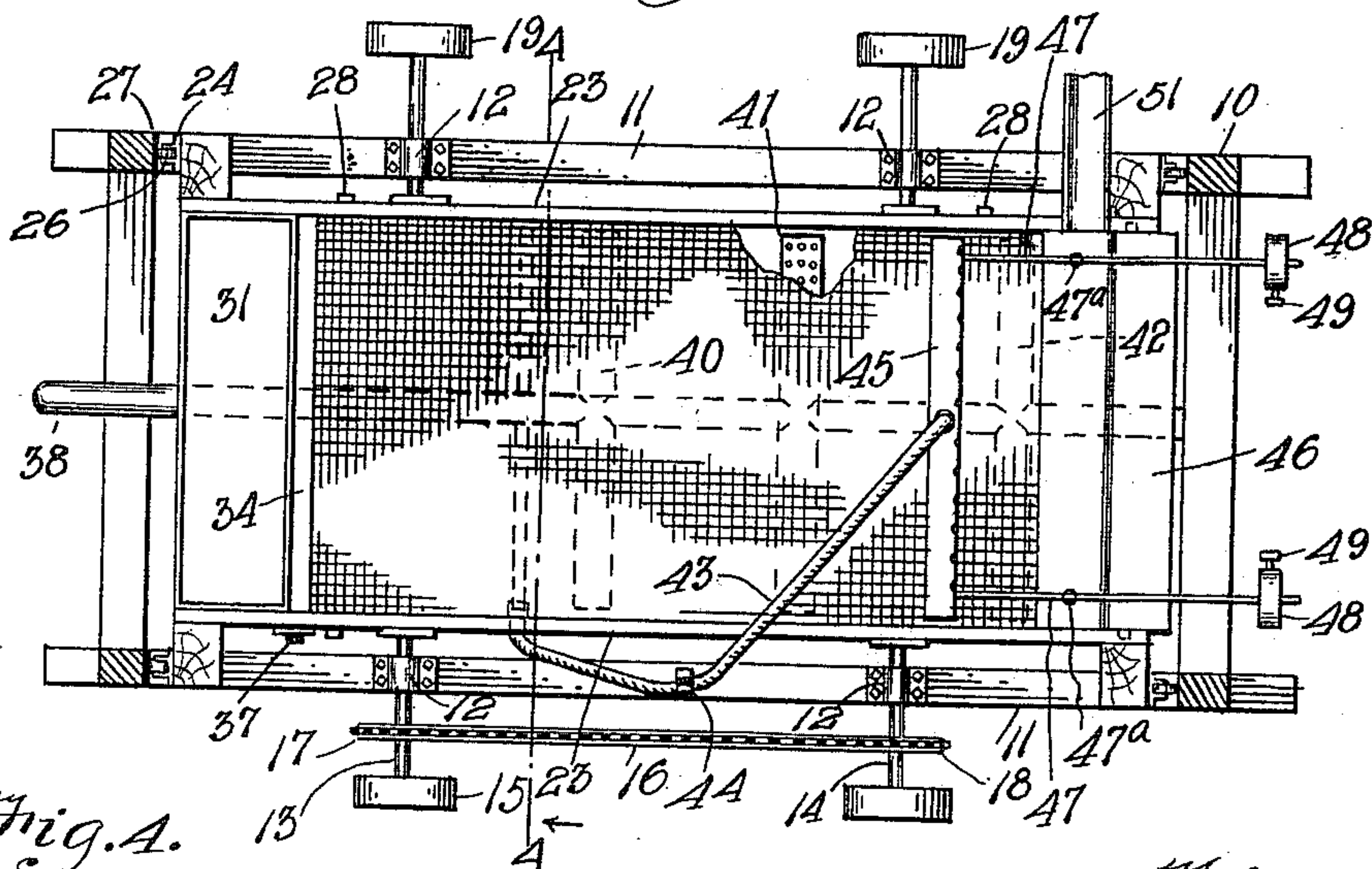


Fig. 4.

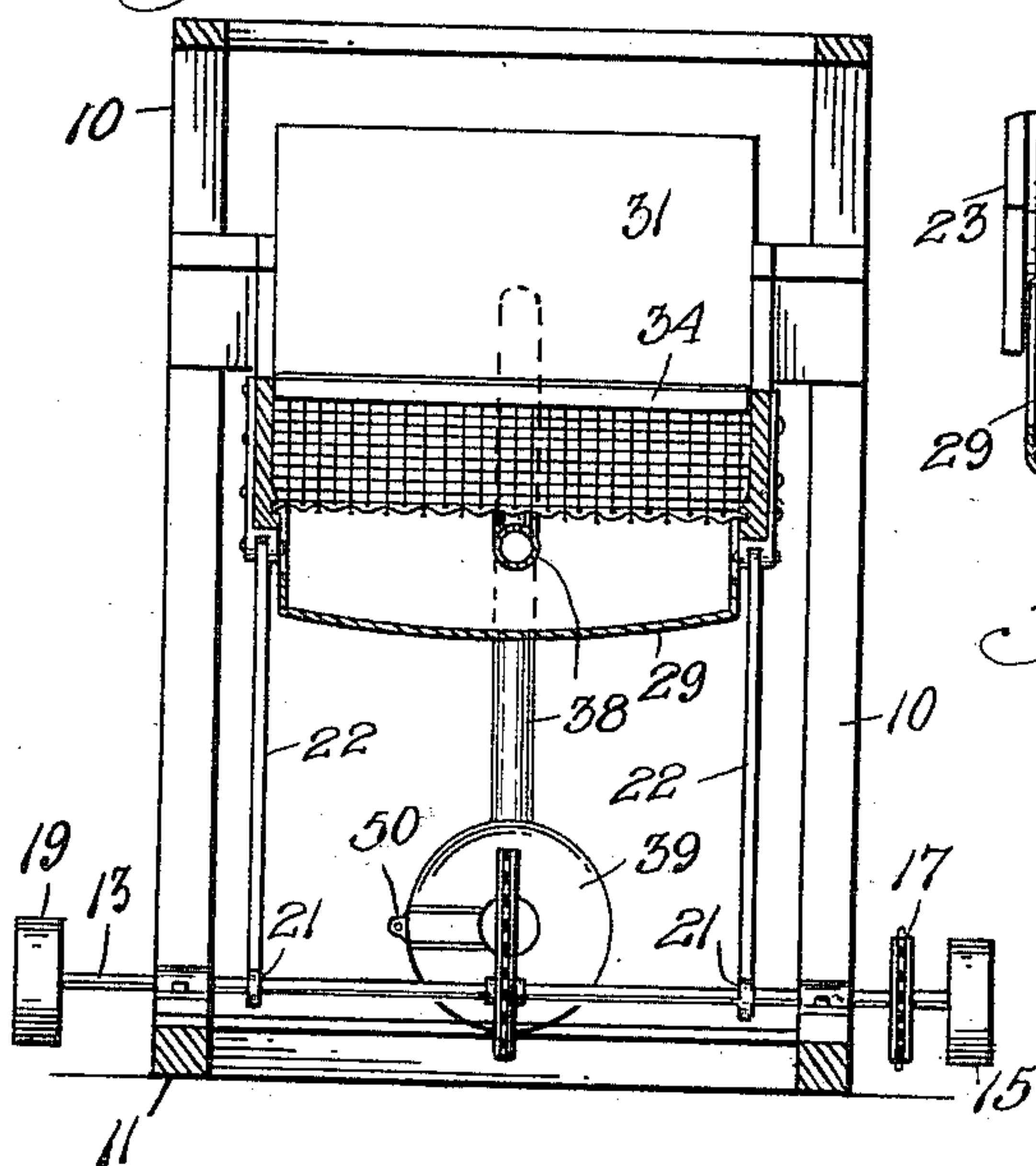


Fig. 5.

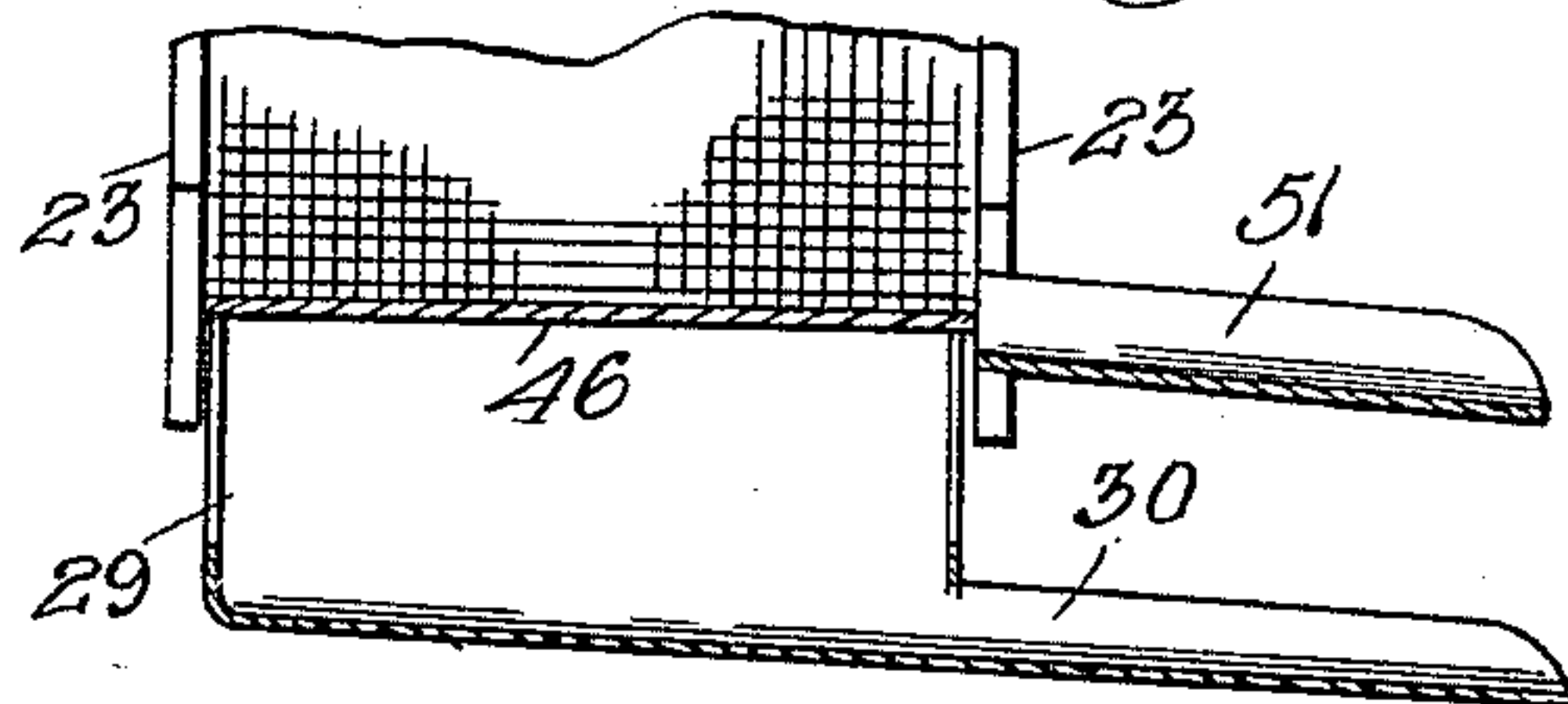


Fig. 6.

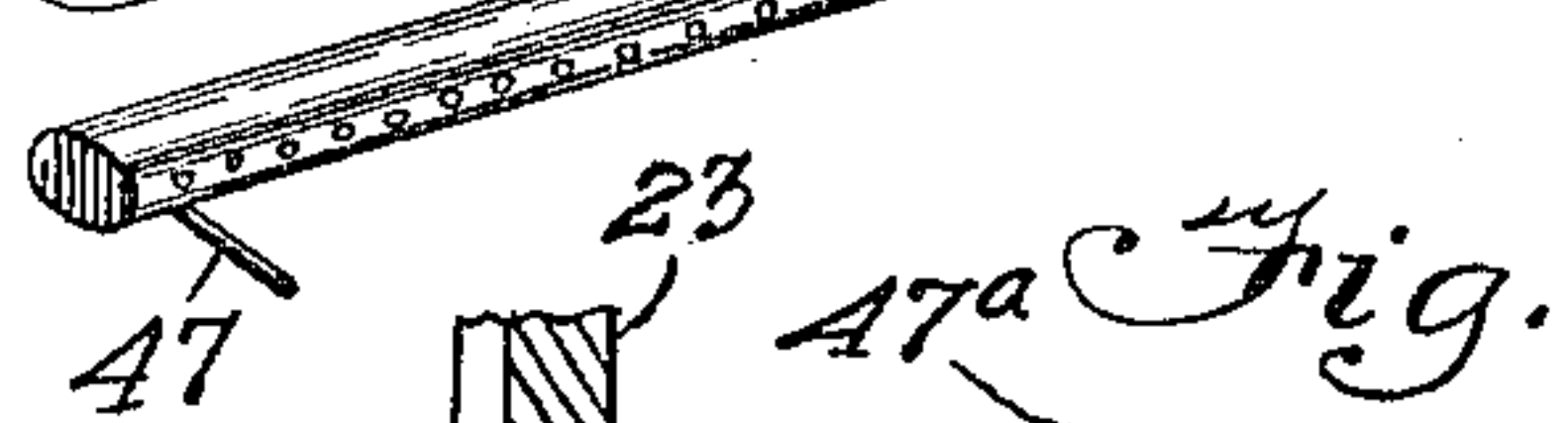


Fig. 10.

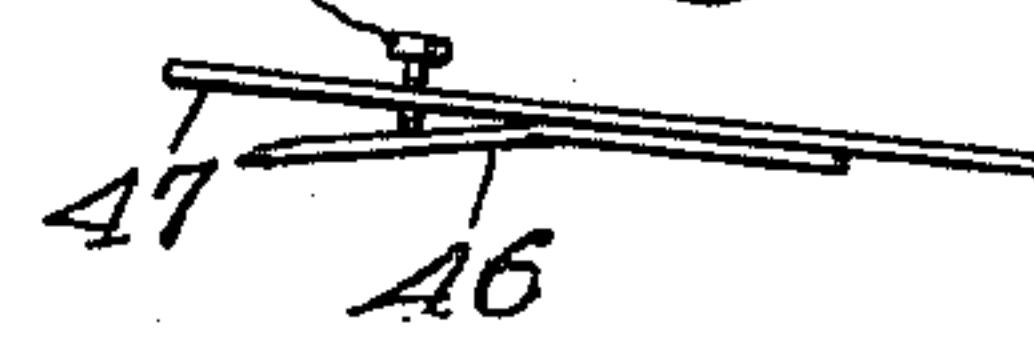
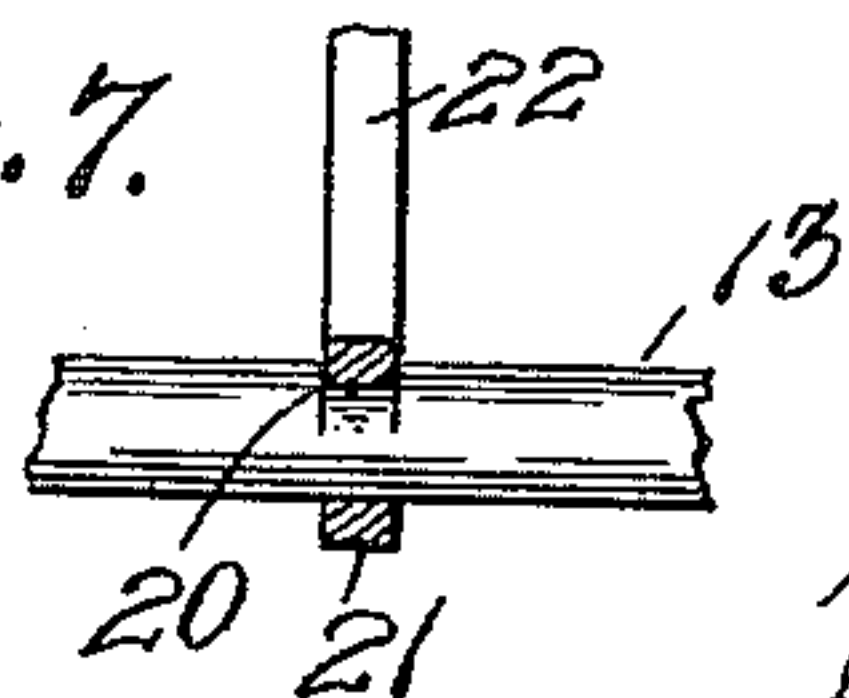


Fig. 11.



Fig. 7.



WITNESSES
G. M. Spring
R. E. Barkley

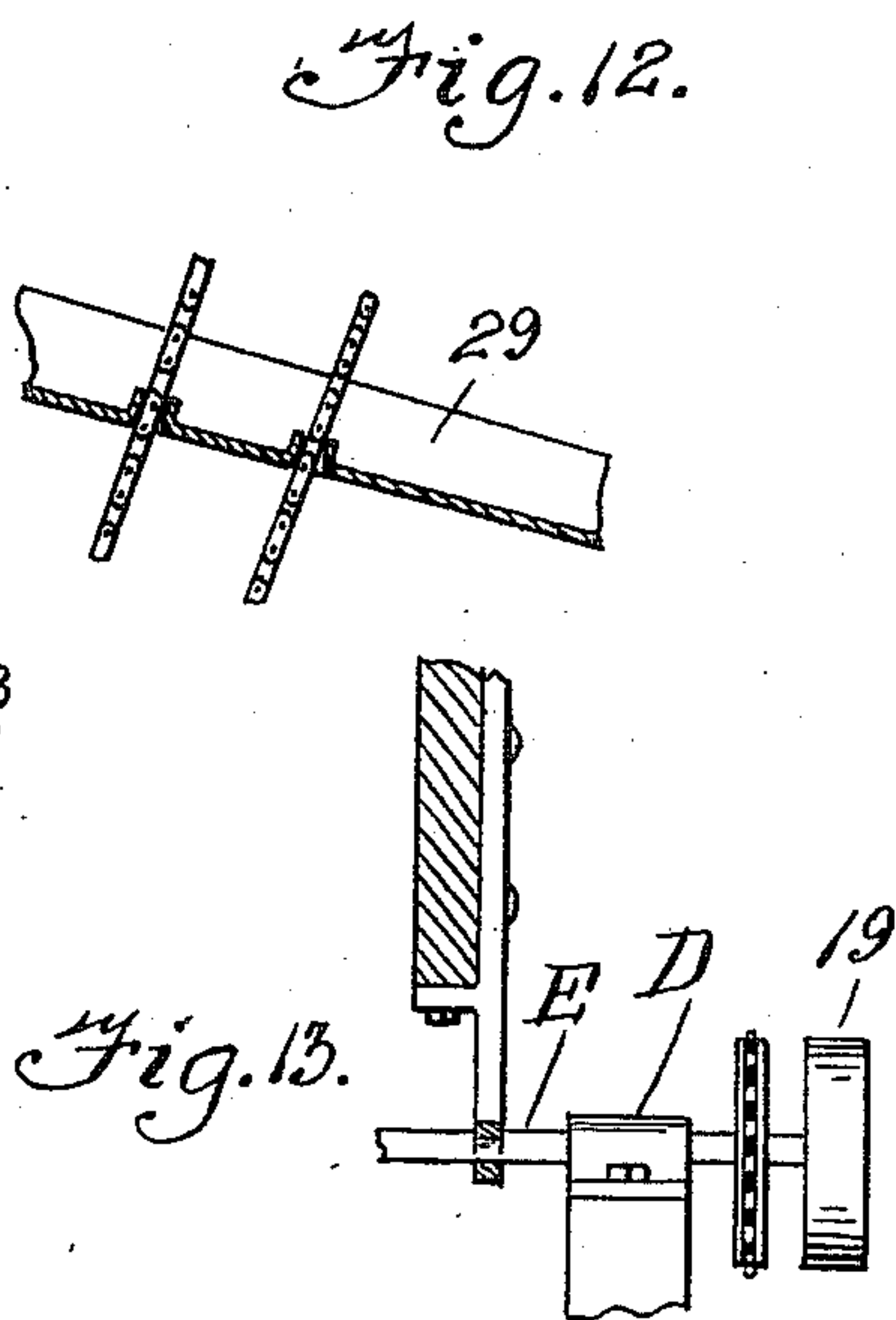
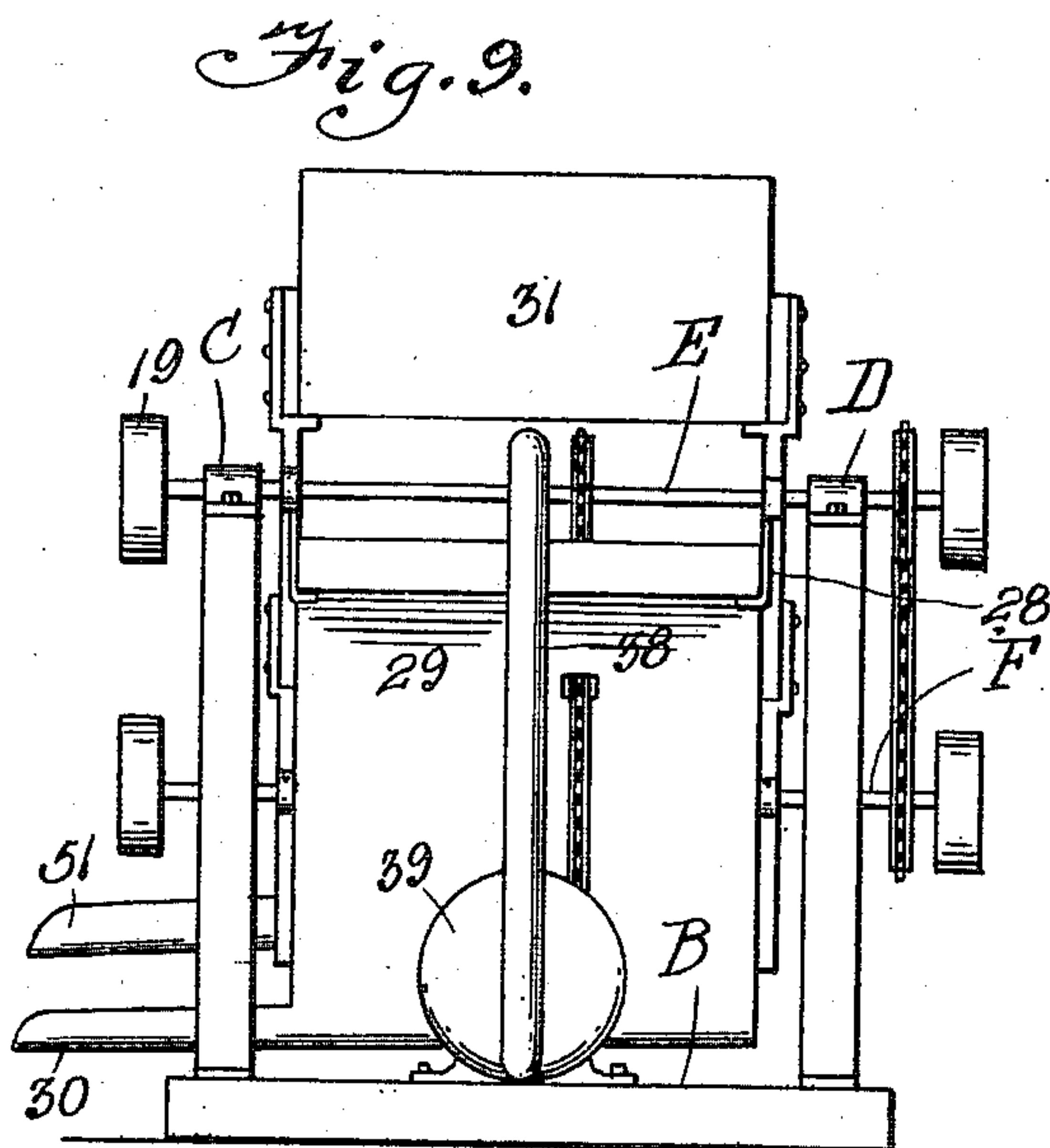
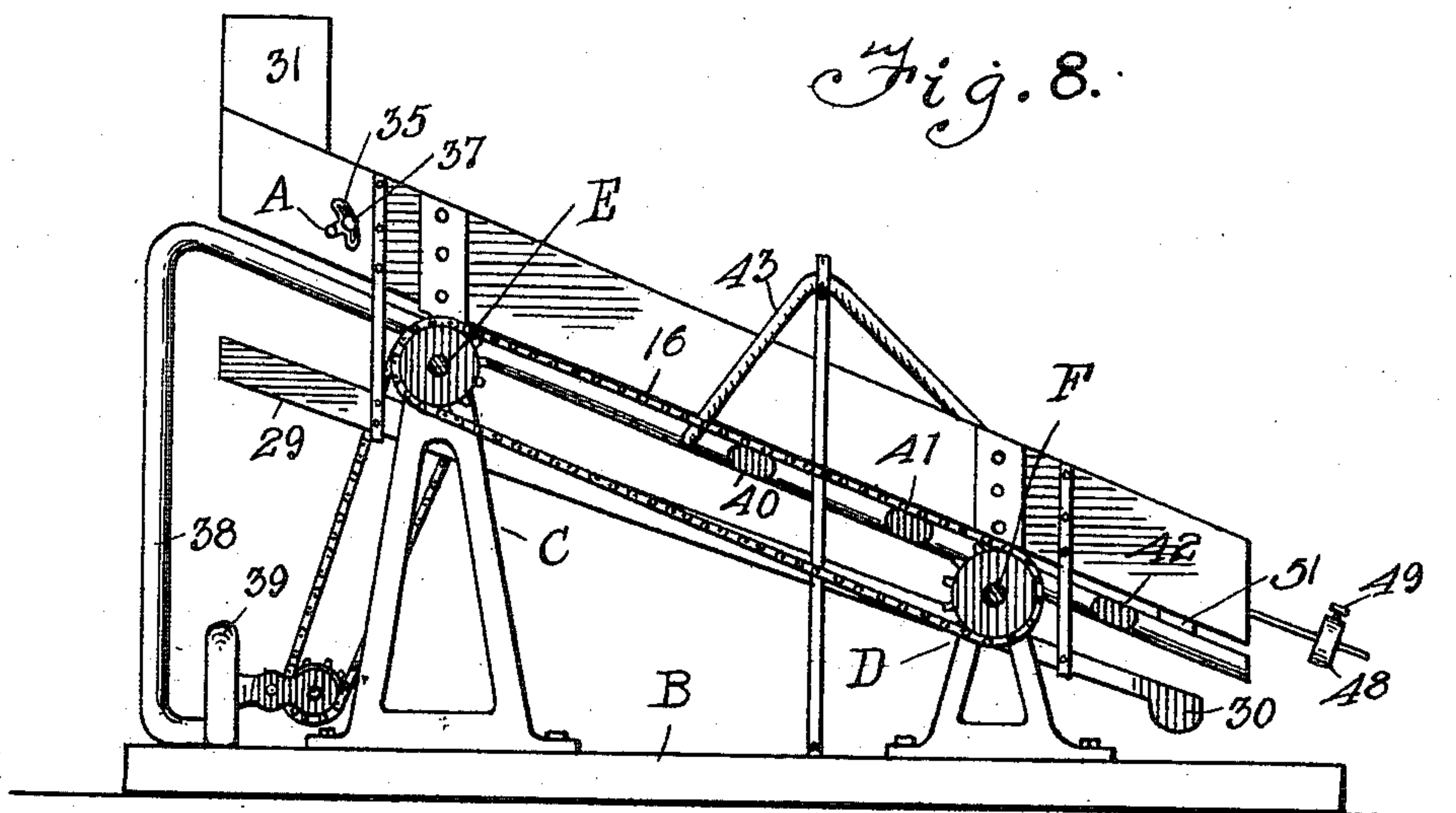
INVENTOR
Samuel Milford Schindel.
by Frank A. Klemm
Attorney

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GRAIN SEPARATOR.
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3 SHEETS—SHEET 3.



WITNESSES

G. M. Spring.
J. E. Barclay.

INVENTOR

Samuel Milford Schindel,
by Frank A. Ahlmann,
ATTORNEY

UNITED STATES PATENT OFFICE.

SAMUEL MILFORD SCHINDEL, OF HAGERSTOWN, MARYLAND.

GRAIN-SEPARATOR.

994,659.

Specification of Letters Patent.

Patented June 6, 1911.

Application filed October 10, 1910. Serial No. 586,344.

To all whom it may concern:

Be it known that I, SAMUEL MILFORD SCHINDEL, a citizen of the United States of America, and resident of Hagerstown, in the county of Washington and State of Maryland, have invented certain new and useful Improvements in Grain-Separators, of which the following is a specification.

This invention relates to the general class of threshing machines and particularly to a class thereunder known as oat, seed and garlic.

An object of this invention is to produce a separator primarily for the purpose of cleaning wheat but the apparatus is capable of use in other capacities as for cleaning grain for milling purposes; for removing cockle, and for separating garlic seed or other foreign substances from the grain and also for cleaning and separating all grains and seeds, the said apparatus having a novel combination of an agitating means and an air blowing or discharging means whereby the action of the air assists the agitating means in causing the separation of the grain and seeds usually found together after the threshing operation of grain.

A still further object of this invention is to produce a screen having novel means for agitating it vertically, the vibratory motion thereof serving to cause the cockle, garlic seed, oat and other foreign substances, owing to their lesser specific gravity to ascend to the surface of the layers of grain passing over the screen, the grain that is lighter than the wheat being forced to the top by the combined action of the air blasts and screen agitation and the cockle finding its way to the surface by reason of the agitation due to the peculiar tendency of the cockle, owing to its form, to travel toward the top when the grain is agitated. The screen is also adapted to allow the smaller grass seeds and grain to pass through its meshes by its own gravity prior to the time the grain reaches the air blasts from beneath.

Furthermore, an object of this invention is to provide novel means for removing the light particles of matter such as oat and the lighter garlic seed from the top surface of the grain through the medium of an air blast issuing from the float adapted to act on the grain, said float pressing down on the top surface of the grains or seeds passing down the screen, the said apparatus being further provided with novel means for removing the

top layers of seeds, grain and foreign matter and leaving it intact, the heavier grain which has, through the operation of the agitator and air current, been left to travel along the screen at the bottom of the material passing over the screen.

It is further an object of this invention to provide automatically actuated means for skimming or removing that portion of the material which it is intended should be rejected and removed and will be contained in the top surface as stated, the said automatically operated means being controlled by the float heretofore mentioned.

It is furthermore, an object of this invention to produce an apparatus in which the air and agitating means are driven from a single source of power thereby enabling the operation of all the parts thereof in a simple and inexpensive manner.

The apparatus is also adapted for use in cleaning all types of grass seed by simply changing the screen having meshes to suit the character of the seeds or grains upon which the machine is operating, and in this connection it is stated that in treating timothy seed containing ripple and plantain seeds which have a greater specific gravity than the timothy seed itself, the operation is reversed setting the skimming plate deeper so as to remove the timothy seed over the top and discharge the seeds above mentioned below. It is also adapted to remove dodder from alfalfa seed and by special adjustments and control of air blasts, all seeds and grain having the slightest difference in specific gravity can be separated one from the other.

With the foregoing and other objects in view, the invention consists in the details of construction and in the arrangement and combination of parts to be hereinafter more fully set forth and claimed.

In describing the invention in detail, reference will be had to the accompanying drawings forming part of this specification wherein like characters denote corresponding parts in the several views, and in which—

Figure 1 illustrates a side elevation of an apparatus embodying the invention; Fig. 2 illustrates a similar view partly in section; Fig. 3 illustrates a top plan view; Fig. 4 illustrates a sectional view on the line 4—4 of Fig. 3; Fig. 5 illustrates a sectional view on the line 5—5 of Fig. 2 with parts of the apparatus omitted, the view being designed for the purpose of illustrating the troughs at

the bottoms of the screen and chute; Fig. 6 illustrates a perspective view of the float; Fig. 7 illustrates an enlarged detail view showing the connection between the pitman and the shaft for agitating the screen; Fig. 8 illustrates a side elevation of a separator embodying a slightly modified construction; and Fig. 9 illustrates an end view thereof; Fig. 10 illustrates a detail view of a portion of the skimmer and parts associated therewith; Fig. 11 illustrates a detail sectional view of a fragment of the screen frame and one of the pitmen; Fig. 12 illustrates a detail sectional view of a fragment of a grain pan; and Fig. 13 illustrates a detail view of the connection between the screen frame and the vibrating shaft.

In these drawings 10 denotes a frame which may be of any appropriate construction, the sills 11 of which have journal bearings 12 thereon for the reception of the shafts 13 and 14, the former of which is connected to the source of power through the medium of a belt 15. The shafts 13 and 14 are positively driven in unison by means of the sprocket chain 16 which engages sprocket wheels 17 and 18 on the said shafts and the said shafts are furthermore provided with counter-balance fly wheels 19 in order to effect a smooth running of the parts.

Each shaft 13 and 14 has eccentrics formed thereon such as shown at 20 in Fig. 7 and the eccentrics are engaged by eccentric straps 21 connected to the pitman 22, each of said pitmen being connected to the side of the screen frame 23 which screen frame is preferably of rectangular construction and has on its ends wear plates 24 and 25 preferably provided with anti-friction rollers or balls 26 which anti-friction members also engage wear plates 27 attached to uprights of the frame. The wear plates have slight recesses or depressions therein for the purpose of forming seats to accommodate the anti-friction members.

The screen frame is provided with stirrups 28 bolted or otherwise secured thereto and hanging therebelow for the purpose of supporting a grain pan 29 designed to receive the small grain removed before reaching the air blast, the lower end of said pan terminating in a transversely disposed spout 30 for carrying off to one side the material that has gained access to the pan.

The upper end of the screen frame has a hopper 31 provided at its lower end with an opening 32 which permits the grain to pass into and over the screen, the said opening being under the control of a gate 34 adjustable with relation to the surface of the screen in order that the feed from the hopper to the screen may be controlled. The sides of the screen frame have plates with slots 35 through which slots bolts 36 in the screen frame project, the said bolts having thumb

nuts 37 thereon for clamping the gate in different positions of adjustment. The plates are connected to the trunnions A of the gate, which trunnions are journaled in the sides of the screen frame.

In order to supply air for the purpose of acting on the material traveling down the screen, I arrange an air conduit 38 extending from a fan 39. The conduit 38 is practically parallel with the under surface of the screen and has a series of lateral branches 40, 41 and 42 beyond the longitudinal center of the screen, all of said branches having perforations in their top surfaces which direct the current of air upwardly through the screen and material traveling thereover, thereby forcing the lighter grains, seeds and foreign substances to the upper surface so that they ride down the inclined screen on top of the heavier grain which it is desired to separate from the said foreign substances.

Associated with the conduit is a hose or flexible pipe 43 supported by the hanger 44 suspended from the frame and connected to a hollow float 45 which rides on the surface of the grain passing down the screen, the said float being near to or remote from the said screen according to the thickness of the material traveling thereover. The float is provided with perforations in its side directed toward the discharge end of the screen the air blast from said perforations materially aiding in the removal of the top layers of lighter material from the heavier material passing down the screen and serving to force the said material over the surface of the skimmer plate 46, which is set at such an angle and at such depth to the surface of the screen for the purpose of removing the foreign substances that have been forced to the top of the layers of grain being treated. By reason of the fact that the skimmer plate 46 is trunnioned in the sides of the screen frame and is connected to the plate 46 through the medium of the rods 47, the movement of the float 45 is communicated to the skimmer plate so that it is set at a depth proportional to the material passing down the screen and proportional to the depth of the strata of foreign substances to be removed. The rods 47 extend beyond the end of the screen and are provided with counterbalance weights 48 adjustable thereon through the medium of set screws 49, that is to say the said weights may be removed near to or remote from the ends of the rods for the purpose of equalizing the pressure of the float on the grain. The rods 47 are also adjustable with relation to the skimmer plate by means of the adjusting screw 47^a and thereby the angle of the said skimmer plate may be changed with relation to the rods.

The fan 39 may be of any appropriate type but I prefer to supply the same with

a sliding gate or valve 50 to control the volume of air supplied to the conduit 38, thereby controlling the force of the blast to suit the grains upon which the machine is operating. The fan is shown as being connected to a power shaft 13 through mechanism by which the fan is driven.

A spout 51 is provided for the purpose of receiving the material which has passed over the skimmer plate and is designed to carry the said material off to the side of the apparatus whereas the grain or material that has been cleaned drops from the end of the screen where it may be delivered to any suitable receptacle or disposed of in any manner convenient to the operator.

In the modified construction shown in Figs. 8 and 9, I dispense with the frame shown in the other views of the drawing and utilize a base composed of sills B on which I mount journal bearings C and D respectively, the former of which is taller than the latter in order to provide for the inclination of the screen and screen frame. The shafts E and F are journaled in the bearings and are made eccentric by cutting away one side thereof, the eccentric portions being journaled in boxes or bearings secured to the under surface of the screen frame. Power is applied to these shafts in any appropriate way and as they rotate they communicate to the screen box and the screen a vertical and longitudinal vibration which tends to enhance the rapidity of movement of the material passing down the screen as compared with the action of the screen on the material when operated simply vertically as contemplated by the apparatus heretofore described.

By using the combination of parts just described the anti-friction devices may be dispensed with and the frame for supporting the mechanism may be simplified to a great extent. The modified construction is provided with means for supplying air for creating blasts or currents of air through the screen and over the material carried by the screen through the medium of the float as is contemplated in the construction first described, the sole object of the modified construction being to reduce the cost of manufacture and maintenance and to provide for the compound movement of the screen both vertically and longitudinally when such a movement is desirable in treating certain types of seed and grain.

I claim—

1. In a grain separator, an inclined screen, means for vibrating the screen vertically, an air conduit extending longitudinally of the screen, means for supplying air thereto, lateral branches beyond the longitudinal center of the said screen toward the end thereof, said branches having perforations for directing air upwardly through the meshes of

the screen, a float loosely held in operative relation to the upper surface of the screen, the said float being hollow and having apertures directed toward the outer end of the screen, means for supplying air to said float, and a skimmer controlled by the action of the float.

2. In a grain separator, a screen supported in an inclined position, means for vibrating the screen, an air conduit extending longitudinally of the screen, means for supplying air thereto, lateral branches connected to the conduit beyond the longitudinal center thereof toward the outer end, said lateral branches having apertures directed upwardly for delivering air through the meshes of the screen, a hollow float having perforations directed toward the outer end of the screen, means for supplying air to said float, a skimmer plate, and means for connecting the float to the skimmer plate whereby the movement of the float is communicated to the skimmer.

3. In a grain separator, a screen supported in an inclined position, means for vibrating the screen, an air conduit extending longitudinally of the screen, means for supplying air thereto, lateral branches connected to the conduit beyond the longitudinal center thereof toward the outer end, said lateral branches having apertures directed upwardly for delivering air through the meshes of the screen, a hollow float having perforations directed toward the outer end of the screen, means for supplying air to said float, a skimmer plate, means for connecting the float to the skimmer plate whereby the movement of the float is communicated to the skimmer plate, and means for adjusting the skimmer plate with relation to the connection between the float and plate.

4. In a grain separator, a screen supported in an inclined position, means for vibrating the screen, an air conduit extending longitudinally of the screen, means for supplying air thereto, lateral branches connected to the conduit beyond the longitudinal center thereof toward the outer end, said lateral branches having apertures directed upwardly for delivering air through the meshes of the screen, a hollow float, said float having perforations directed toward the outer end of the screen, means for supplying air to said float, a skimmer plate, means for connecting the float to the skimmer plate whereby the movement of the float is communicated to the skimmer, and means for counterbalancing the float.

5. In a grain separator, a screen supported in an inclined position, means for vibrating the screen, an air conduit extending longitudinally of the screen, means for supplying air thereto, lateral branches connected to the conduit beyond the longitudinal center thereof toward the outer end, said

lateral branches having apertures directed upwardly for delivering air through the meshes of the screen, a hollow float having perforations directed toward the outer end of the screen, means for supplying air to the float, a skimmer plate, means for connecting the float to the skimmer plate whereby the movement of the float is communicated to the skimmer plate, and means for adjusting the skimmer plate with relation to the connection between the float and plate, and means for counterbalancing the float.

6. In a grain separator, a screen supported in an inclined position, a hopper at the inner end of said screen in communication with the said screen, means for controlling the discharge of material from the hopper to the screen, means for vibrating the screen vertically, an air conduit extending longitudinally of the screen, means for supplying air thereto, lateral branches beyond the longitudinal center of the said screen toward the end thereof, said branches having perforations for directing air upwardly through the meshes of the screen, a float loosely held in operative relation to the upper surface of the screen, the said float being hollow and having apertures directed toward the outer end of the screen, means for supplying air to said float, and a skimmer controlled by the action of the float.

7. In a grain separator, a screen supported in an inclined position, a hopper at the inner end of said screen in communication with the said screen, means for controlling the discharge of material from the hopper to the screen, means for vibrating the screen, an air conduit extending longitudinally of the screen, means for supplying air thereto, lateral branches connected to the conduit beyond the longitudinal center thereof toward the outer end, said lateral branches having apertures directed upwardly for delivering air through the meshes of the screen, a hollow float having perforations directed toward the outer end of the screen, means for supplying air to said float, a skimmer plate, and means for connecting the float to the skimmer plate whereby the movement of the float is communicated to the skimmer plate.

8. In a grain separator, a screen supported in an inclined position, a hopper at the inner end of said screen in communication with the said screen, means for controlling the discharge of material from the hopper to the screen, means for vibrating the screen, an air conduit extending longitudinally of the screen, means for supplying air thereto, lateral branches connected to the conduit beyond the longitudinal center thereof toward the outer end, said lateral branches having apertures directed upwardly for delivering air through the

meshes of the screen, a hollow float having perforations directed toward the outer end of the screen, means for supplying air to said float, a skimmer plate, means for connecting the float to the skimmer plate whereby the movement of the float is communicated to the skimmer plate, and means for adjusting the skimmer plate with relation to the connection between the float and plate.

9. In a grain separator, a screen supported in an inclined position, a hopper at the inner end of said screen in communication with the said screen, means for controlling the discharge of material from the hopper to the screen, means for vibrating the screen, an air conduit extending longitudinally of the screen, means for supplying air thereto, lateral branches connected to the conduit beyond the longitudinal center thereof toward the outer end, said lateral branches having apertures directed upwardly for delivering air through the meshes of the screen, a hollow float having perforations directed toward the outer end of the screen, means for supplying air to said float, a skimmer plate, means for connecting the float to the skimmer plate whereby the movement of the float is communicated to the skimmer plate, and means for counterbalancing the float.

10. In a grain separator, a screen supported in an inclined position, a hopper at the inner end of said screen in communication with the said screen, means for controlling the discharge of material from the hopper to the screen, means for vibrating the screen, an air conduit extending longitudinally of the screen, means for supplying air thereto, lateral branches connected to the conduit beyond the longitudinal center thereof toward the outer end, said lateral branches having apertures directed upwardly for delivering air through the meshes of the screen, a hollow float having perforations directed toward the outer end of the screen, means for supplying air to the float, a skimmer plate, means for connecting the float to the skimmer plate whereby the movement of the float is communicated to the skimmer plate, means for adjusting the skimmer plate with relation to the connection between the float and plate, and means for counterbalancing the float.

11. In a grain separator, a screen supported in an inclined position, means for vibrating the screen, said screen having a frame, a grain pan, means connected to the screen frame for supporting the grain pan for receiving the material screened from the grain, means for supplying air blasts through the meshes of the screen, a hollow float having perforations for directing currents of air over the surface of material passing down the screen, means for supply-

ing said float with air, a skimmer plate
trunnioned in the sides of the screen frame,
means for connecting the float and skim-
mer plate whereby the movement of the
5 float is communicated to the skimmer plate,
and means for counter-balancing the float.

12. In a grain separator, a frame, a screen
frame having a screen therein, means for
vibrating the screen frame with relation to
10 the first mentioned frame, wear plates on the
screen frame and first mentioned frame,
anti-friction members interposed between
the wear plates, an air conduit under the
screen and extending longitudinally thereof,
15 means for supplying air to the conduit, lat-
eral branches in communication with the con-
duit, said branches having perforations in
their upper walls to direct air through the
screen, a float having means for delivering
20 air for dislodging material from the screen,
and a skimmer plate acting in conjunction
with the said float.

13. In a grain separator, an inclined
screen, means for vibrating the screen, means
25 for discharging air upwardly through the
meshes of the screen, a float loosely held in
operative relation to the upper surface of
the screen, the said float being hollow and
having apertures directed toward the outer
30 end of the screen, means for supplying air
to said float and a skimmer controlled by
the action of the float.

14. In a grain separator, an inclined
screen, means for vibrating the screen,
35 means for discharging air upwardly through
the meshes of the screen, a float loosely held
in operative relation to the upper surface
of the screen and provided with means for
discharging air toward the outer end of the

screen, and a skimmer controlled by the 40
float.

15. In a grain separator, an inclined
screen, means for vibrating the screen, means
for delivering air upwardly through the
meshes of the screen, a float loosely held in 45
operative relation to the upper surface of
the screen, and a skimmer controlled by the
action of the float.

16. In a grain separator, an inclined
screen, means for vibrating the screen, means 50
for delivering air upwardly through the
meshes of the screen, a float loosely held in
operative relation to the upper surface of
the screen, means for directing air current
over the surface of the screen toward the 55
end thereof, a skimmer movable with rela-
tion to the screen, and means for controlling
the position of the skimmer with relation
to the surface of the screen.

17. In a grain separator, an inclined 60
screen, means for vibrating the screen, a
float loosely held in operative relation to the
upper surface of the screen for engaging
grain passing thereover, and a skimmer con-
trolled by the action of the float. 65

18. In a grain separator, an inclined
screen, means for vibrating the screen, a
skimmer for removing a portion of the ma-
terial passing down the screen, and means 70
moved by the material on the screen for con-
trolling the position of the skimmer with re-
lation to the surface of the screen.

In testimony whereof, I affix my signature
in the presence of two witnesses.

SAMUEL MILFORD SCHINDEL.

Witnesses:

J. ROSS COLHOUN,
L. E. BARKLEY.