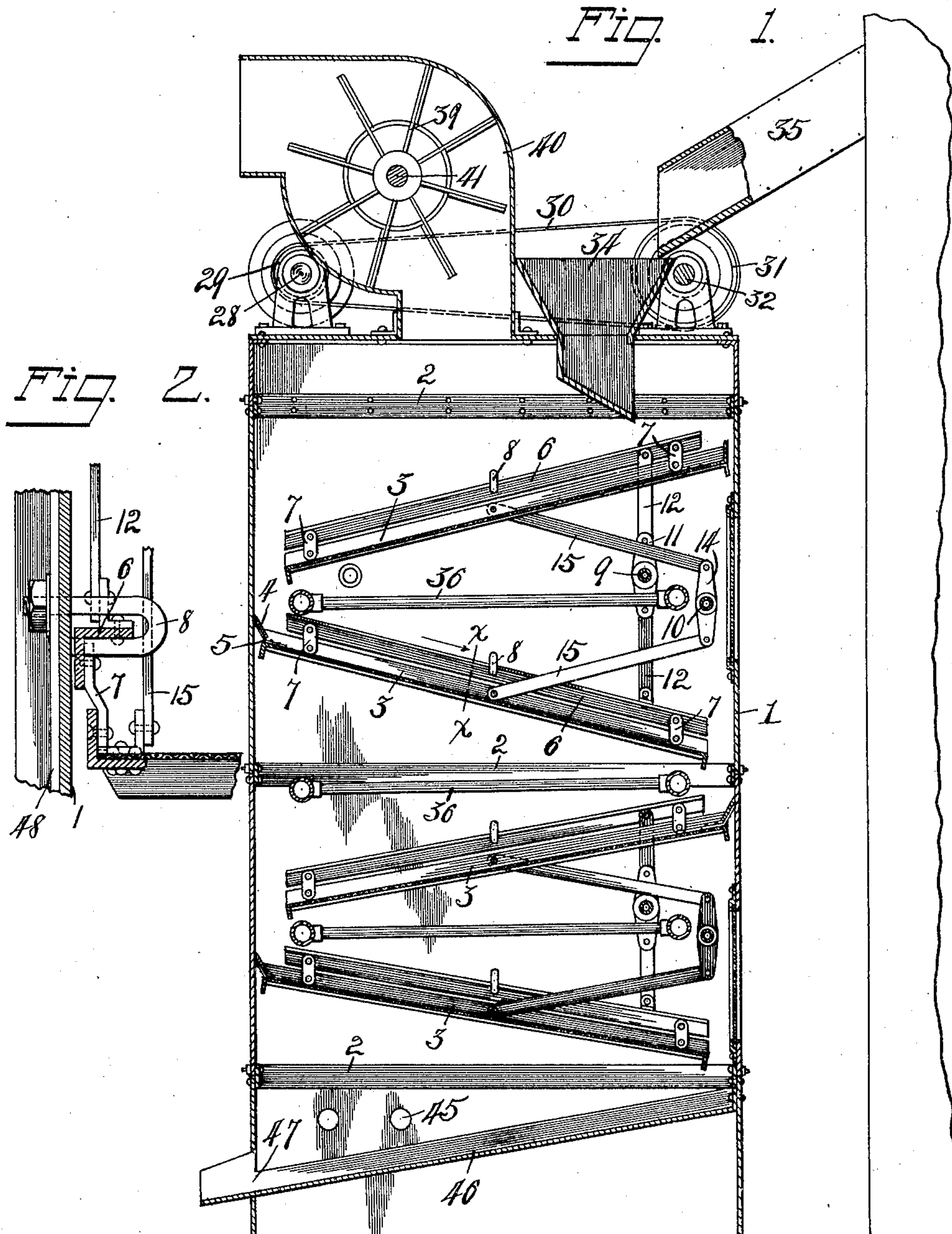


W. H. SLAYBAUGH.
DRIER FOR GRAIN OR THE LIKE.
APPLICATION FILED SEPT. 22, 1910.

997,016.

Patented July 4, 1911.

3 SHEETS—SHEET 1.



WITNESSES:
C. H. Bilb.
M. G. Gaskell

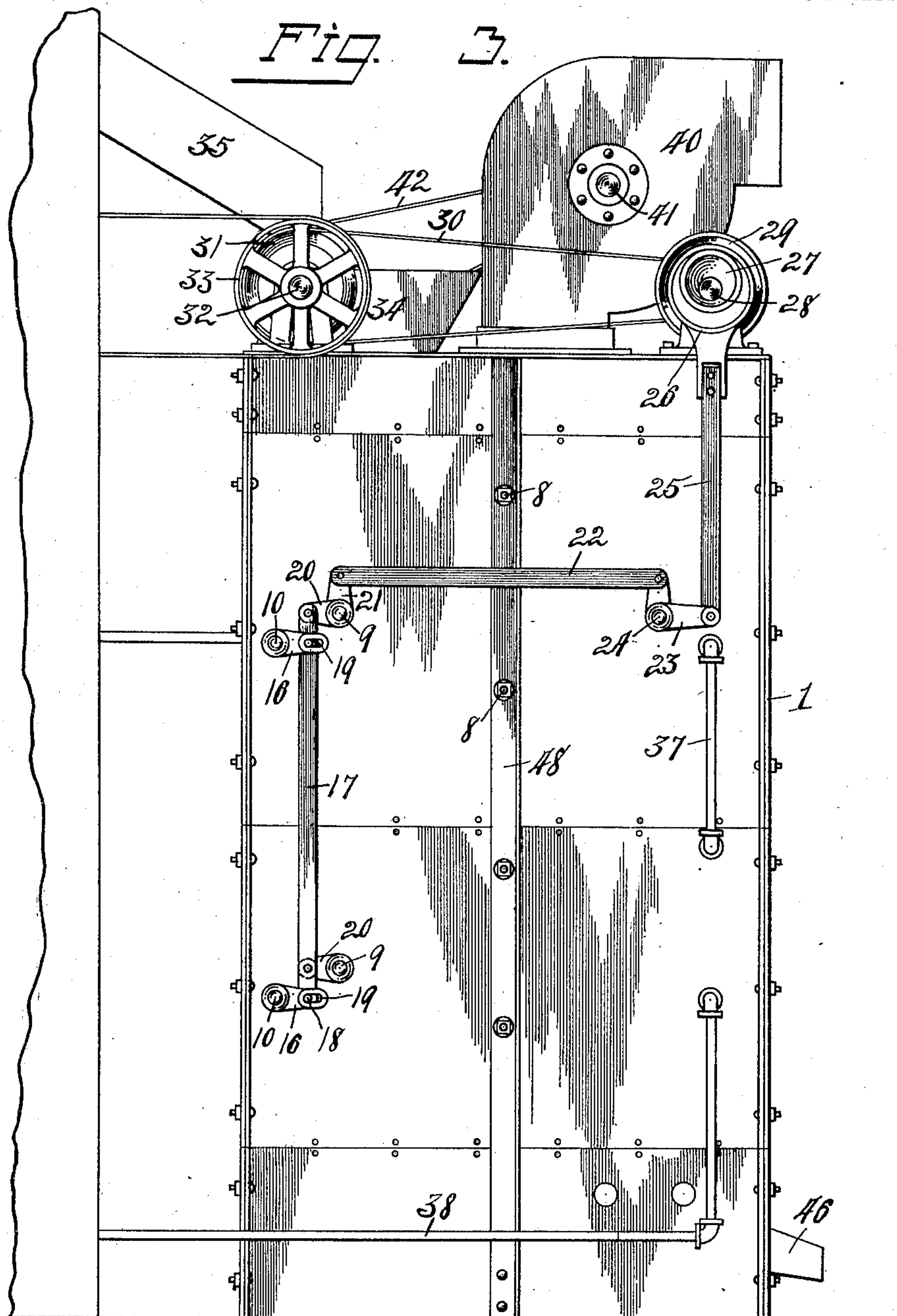
INVENTOR.
William H. Slaybaugh,
By Owen & Owen,
His attys.

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3 SHEETS—SHEET 2.



WITNESSES:

G. H. Bills.
M. G. Gaskell.

INVENTOR.

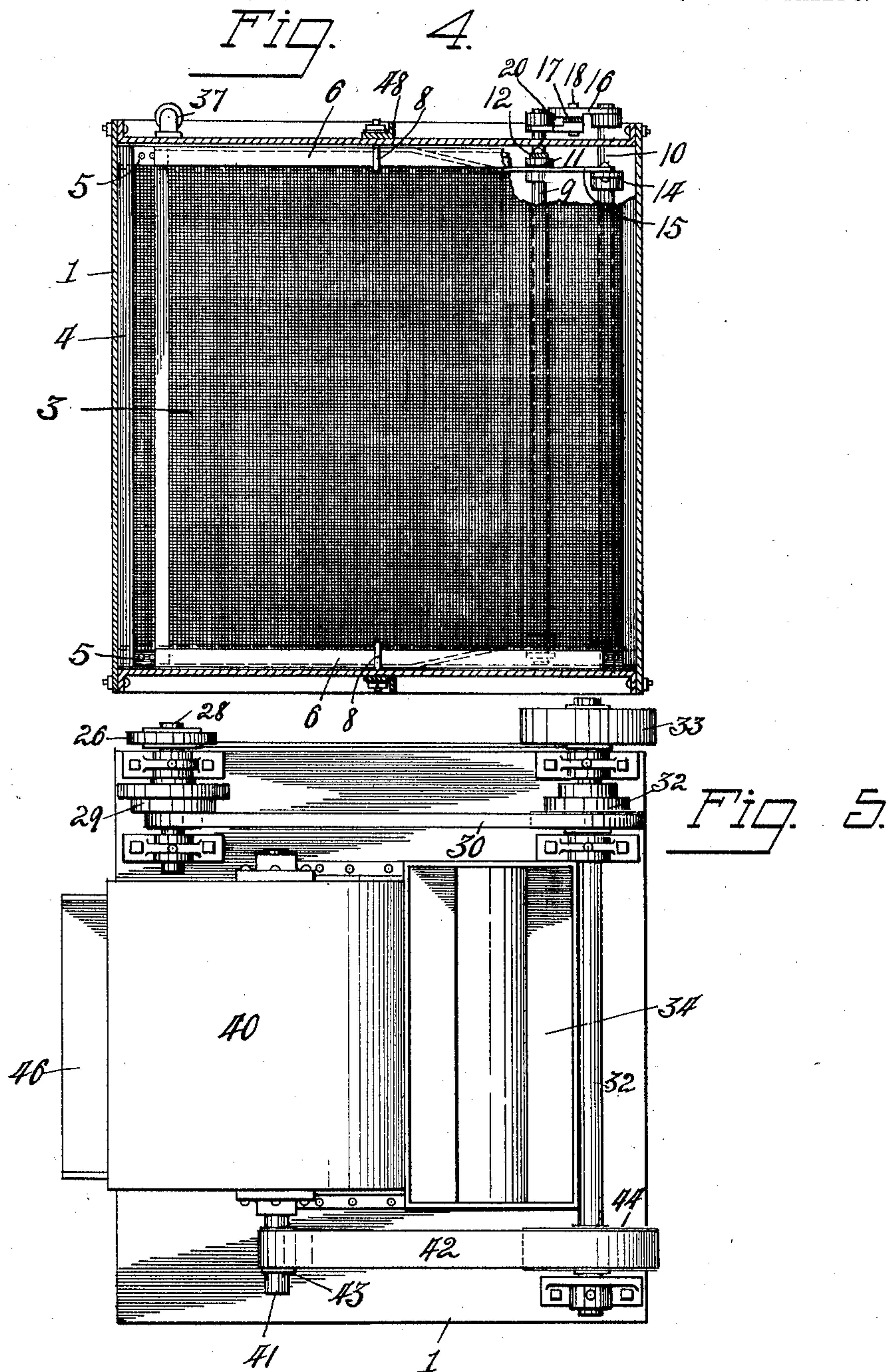
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3 SHEETS—SHEET 3.



WITNESSES:

G. H. Bills.
M. G. Gaskell.

INVENTOR.

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UNITED STATES PATENT OFFICE.

WILLIAM H. SLAYBAUGH, OF EAST TOLEDO, OHIO, ASSIGNOR OF THREE-EIGHTHS TO
WILLIAM T. DAVIES, OF TOLEDO, OHIO.

DRIER FOR GRAIN OR THE LIKE.

997,016.

Specification of Letters Patent.

Patented July 4, 1911.

Application filed September 22, 1910. Serial No. 583,297.

To all whom it may concern:

Be it known that I, WILLIAM H. SLAY-
BAUGH, a citizen of the United States, and
a resident of East Toledo, in the county of
5 Lucas and State of Ohio, have invented a
certain new and useful Drier for Grain or
the Like; and I do hereby declare the fol-
lowing to be a full, clear, and exact descrip-
tion of the invention, such as will enable
10 others skilled in the art to which it apper-
tains to make and use the same, reference
being had to the accompanying drawings,
and to the figures of reference marked there-
on, which form a part of this specification.

15 My invention relates to driers for grain,
corn or the like, but is not restricted to such
use as it can be used in any connection for
which it may be appropriate as for screen-
ing purposes or the like.

20 The object of my invention is the pro-
vision of an improved apparatus of this
class, which is simple and efficient in its
construction, economical of manufacture,
and capable of being easily and quickly set
25 up or knocked down, whereby to enhance
its practicability and commercial value.

The invention is fully described in the
following specification, and while in its
broader aspect it is capable of embodiment
30 in numerous forms, a preferred embodiment
thereof is illustrated in the accompanying
drawings, in which,—

Figure 1 is a central vertical section of the
apparatus embodying the invention. Fig. 2
35 is an enlarged section, on the line $x x$ in
Fig. 1. Fig. 3 is a side elevation of the
machine. Fig. 4 is a cross-section on the
line $y y$ in Fig. 3, with a portion broken
away, and Fig. 5 is a top plan view thereof.

40 Referring to the drawings, 1 designates
the housing or casing of an apparatus com-
prising my invention, and is shown, in the
present instance, as comprising a plurality
of rectangular sections, preferably of sheet-
45 metal, which are placed edge to edge one
over the other to build the apparatus to any
desired height, the abutting edges of the
sections being secured together by bands 2
which are bolted to the associated edges of
50 the sections which they lap. This provides
a housing structure which can be easily
built up or knocked down, as desired.

Located within the housing 2 in superim-
posed order are a plurality of shaker-frames

3, which have their bottoms adapted for the 55
passage of air therethrough, being screened,
perforated or otherwise suitably formed for
such purpose. Alternate ones of the shaker-
frames 3 are oppositely inclined, as indi-
cated, and the elevated end of each frame 60
projects beyond the adjacent or lower end
of the frame next above to adapt it to catch
matter falling therefrom. It is thus appar-
ent that matter will pass in one direction
down one frame, from which it falls to the 65
elevated end of the frame next below and
passes down it in the opposite direction, and
so on to the bottom of the apparatus. The
elevated end of each frame, except in the
present instance the top one, is provided 70
with an upwardly and outwardly projecting
flange 4 which is carried by the frame and
continually held in contact with the adja-
cent side of the housing 1 during a recipro-
catory or shaking movement of the associ- 75
ated frame by spring fingers 5, as shown,
thus preventing matter falling from one
frame to another from passing between the
housing side and the elevated end of a
frame. 80

Each frame 3 is suspended at the sides
thereof from bars 6 by pivotal links 7 which
connect the bars and frame adjacent their
ends. The bars 6 are preferably of angle
iron, as best shown in Fig. 2, and have their 85
horizontal flanges projecting inwardly from
the housing sides and resting upon the
downwardly and inwardly turned ends
of fulcrum pins 8 which project from the
adjacent housing sides centrally of the bars 90
6. The frames are arranged and operated
in pairs and between the spaced ends of each
pair transversely thereof are located the
rock-shafts 9 and 10, which are suitably
journaled in the housing sides and project 95
at one end without such sides, as shown in
Fig. 3. The shaft 9 carries a vertically dis-
posed cross-arm 11, the opposite ends of
which are connected by links 12, 12 to the
adjacent ends of the associated bars 6, as 100
best shown in Fig. 1, thus adapting a rock-
ing of the shaft 9 to effect a vertical rocking
of the bars 6 and attached frames 3 toward
and away from each other. The rock-shaft
10 has vertically disposed cross-arms 14 105
mounted thereon adjacent the housing sides,
the ends of which are connected by links
15, 15 to the respective upper and lower

frames 3 of the associated set adjacent their centers, as indicated, thus causing a rocking of the shafts 10 to impart a longitudinal reciprocatory movement to each of the attached frames 3. The connecting of the rock-shafts to the frames 3 and bars 6 in this manner causes them to have vertical oscillatory movements toward and away from each other and simultaneous horizontal shaking or reciprocatory movements in reverse directions, thus creating a balanced action to eliminate jar from the apparatus.

The shafts 10 are provided without one side of the housing 1 with horizontally-projecting crank-arms 16, which are all connected together by a vertical bar 17 having pins 18 working in horizontal slots 19 in the arm ends, as shown in Fig. 3. The bar 17 also attaches to the outer ends of rock-arms 20 projecting horizontally from the associated ends of the rock-shafts 9, and the upper of such shafts has a rock-arm 21 projecting vertically therefrom and connected by a bar 22 to the vertical arm of a bell-crank lever 23, which is fulcrumed to a stud 24 projecting from the housing side. The horizontal arm of the lever 23 is connected by a bar 25 to an eccentric strap 26 which is mounted on an eccentric 27 carried by a shaft 28 on top of the housing 1. The shaft 28 is shown, in the present instance, as carrying a stepped pulley 29 which is connected by a belt 30 to a stepped pulley 31 on a shaft 32 mounted on the top of the housing adjacent one side thereof. The shaft 32 carries a drive pulley 33 which may be driven in any suitable manner. It is apparent that all of the rock-shafts 9 and 10 are operated in unison from a single eccentric 27 and that such eccentric may be driven at any desired speed by changing the belt on the stepped pulleys 29 and 31.

Grain or other matter is delivered to the elevated end of the upper shaker frame 3 through a hopper 34 into which it may be deposited by a chute 35 or in any other suitable manner.

Located within the apparatus between the shaker frames 3 are a plurality of sets of steam coils 36 which are shown as connecting with each other without the sides of the housing 1 by pipes 37 and the lower one as having connection with a supply pipe 38. The purpose of the steam pipes 36 is to heat air passing through the apparatus to facilitate a drying of matter in its passage over the shakers 3.

A circulation is created within the housing 1 by a fan 39 which is carried within a conduit or casing 40 at the top of the housing by a shaft 41. The fan is driven by a belt 42 connecting the pulley 43 on its shaft with the pulley 44 on the shaft 32. (See Fig. 5.) The conduit 40 has communication with the interior of the housing through the

top thereof and upon a rotation of the fan, air is caused to enter the housing through openings 45 at the lower end thereof and pass upwardly through the housing and perforated bottoms of the frames 3, being heated by radiant heat from the steam pipes 36 as it ascends, and leaves the housing through the conduit 40.

Grain or other matter, after leaving the lower shaker frame 3, drops upon an inclined trough 46 by which it is delivered from the housing through an opening 47 in one side thereof.

48 designates angle-iron bars which are secured vertically to the sides of the housing and serve to strengthen such sides, unite the sections thereof, and to hold the fulcrum pins 8 supporting the bars 6.

In the operation of my improved apparatus, grain, corn or other matter to be dried is deposited in the hopper 34 by which it is delivered to the upper shaker frame 3. The matter traverses the length of the successive frames, falling from one to the other in its progress and finally being delivered in a dried state from the apparatus by the delivery trough 46. The matter is agitated and its progress over the respective frames 3 facilitated by the compound vertical oscillatory and horizontal reciprocatory shaking movements which are communicated to the frames 3 by their connection with the rock-shafts 9 and 10, which are in turn rocked by suitable connection with the eccentric 27, as above described. As the grain or other matter when in a wet or damp state is more sluggish in its movements and therefore does not move as readily as when in a dry state, each frame 3 is preferably inclined slightly more than the one next below, as shown in Fig. 1. As the grain passes downwardly across the shaker frames and from one to another thereof, the hot air passing upwardly through the interior of the housing and the perforated bottoms of the frames causes the matter to be thoroughly dried before leaving the housing. While only four shaker frames are shown, it is apparent that any desired number of the same may be used.

I wish it understood that my invention is not limited to any specific construction or arrangement of the parts except in so far as such limitations are specified in the claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is,

1. In an apparatus of the class described, the combination of a plurality of superimposed shaker-frames, alternate ones of which are oppositely inclined, and mechanism operative to impart compound oscillatory and reciprocatory movements to such frames.

2. In an apparatus of the class described, the combination of a plurality of superim-

posed shaker-frames, alternate ones of which are oppositely inclined, and mechanism connecting such frames in pairs and operative to cause the frames of a pair to have reciprocatory movements and vertical oscillatory movements in unison.

3. In an apparatus of the class described, the combination of a plurality of superimposed shaker-frames, alternate ones of which are oppositely inclined, and mechanism connecting such frames in pairs and operative to cause the frames of each pair to have reverse reciprocatory movements and vertical oscillatory movements in unison.

4. In an apparatus of the class described, the combination of a housing, bars fulcrumed to opposite sides of the housing for vertical oscillatory movements, shaker-frames carried in superimposed order by said bars for oscillatory movements therewith and reciprocatory movements relative thereto, and mechanism operative to impart oscillatory movements to the bars and reciprocatory movements to the shaker-frames.

5. In an apparatus of the class described, the combination of a housing, bars fulcrumed in superimposed order to opposite sides of the housing for vertical oscillatory movements, shaker-frames carried in superimposed order by such bars for shaking movements relative thereto, and mechanism operative to impart oscillatory movements in unison to the bars.

6. In an apparatus of the class described, the combination of a plurality of superimposed shaker frames, alternate ones of which are oppositely inclined and being mounted for vertical oscillatory movements, and mechanism connecting the shaker-frames in pairs and operative to cause the frames of each pair to have opposed vertical oscillatory movements in unison.

7. In an apparatus of the class described, the combination of a housing, members fulcrumed to opposite sides thereof for vertical oscillatory movements, shaker-frames carried in superimposed order by such members for reciprocatory movements relative thereto, alternate ones of such frames being oppositely inclined, and mechanism operative to impart compound oscillatory and horizontal reciprocatory movements in unison to the shaker-frames.

8. In an apparatus of the class described, the combination of a housing, bars fulcrumed for vertical oscillatory movements to opposite sides thereof, shaker-frames arranged in superimposed order within the housing and carried by said bars for reciprocatory movements relative thereto, and mechanism connecting the bars and shaker-frames in pairs and operative to impart opposed oscillatory movements to the bars of a pair and opposed reciprocatory movements to the frames of a pair.

9. In an apparatus of the class described, the combination of a housing, shaker-frames mounted in superimposed order therein for vertical oscillatory and longitudinal reciprocatory movements, said frames being arranged in pairs and alternate ones thereof being oppositely inclined, two rock-shafts associated with each pair, means connecting one rock-shaft and the frames for imparting opposed oscillatory movements thereto when the shaft is rocked, means connecting the other shaft and the frames of the associated pair to impart reciprocatory movements thereto when the shaft is rocked, and mechanism operative to simultaneously rock such shafts.

10. In an apparatus of the class described, the combination of a housing, bars fulcrumed to opposite sides thereof for vertical oscillatory movements, shaker-frames arranged in superimposed order within the housing and carried by such bars for reciprocatory movements relative thereto, said frames and bars being arranged in pairs and alternate ones thereof being oppositely inclined, two rock-shafts associated with each pair, connection between one rock-shaft and the bars of the associated pair to impart oscillatory movements thereto when the shaft is rocked, connection between the other shaft and the frames of the associated pair to impart reciprocatory movements thereto when the shaft is rocked, and mechanism operative to rock such shafts in unison.

11. In an apparatus of the class described, the combination of a housing, bars fulcrumed to opposite sides thereof for vertical oscillatory movements, shaker-frames arranged in superimposed order within the housing and carried by such bars for longitudinal reciprocatory movements relative thereto, said bars and frames being arranged in pairs, two rock-shafts associated with each pair intermediate the frames thereof, connection between one of such shafts and the bars of a pair for imparting opposed oscillatory movements thereto when the shaft is rocked, connection between the other shaft and the frames of an associated pair for imparting opposed longitudinal reciprocatory movements thereto when the shaft is rocked, and mechanism for rocking such shafts in unison.

12. In an apparatus of the class described, a plurality of superimposed perforate shaker-frames mounted within the housing for oscillatory and longitudinal reciprocatory movements, mechanism operative to impart such movements in unison to the shaker-frames, air heating means within the housing, and means for creating a circulation of air therethrough.

13. In an apparatus of the class described, the combination with a housing, a plurality of shaker-frames arranged in superimposed

order therein, alternate ones of said frames being oppositely inclined, mechanism for imparting agitating movements to the frames and yielding means associated with
5 the elevated end of each frame, except the upper one, such means being adapted to remain in yielding contact with the associated housing side during a shaking movement of the frames to prevent an escape of the mat-

ter between such side and the elevated end 10 of the associated frame.

In witness whereof I have hereunto signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. SLAYBAUGH.

Witnesses:

C. W. OWEN,
E. E. THOMAS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
