

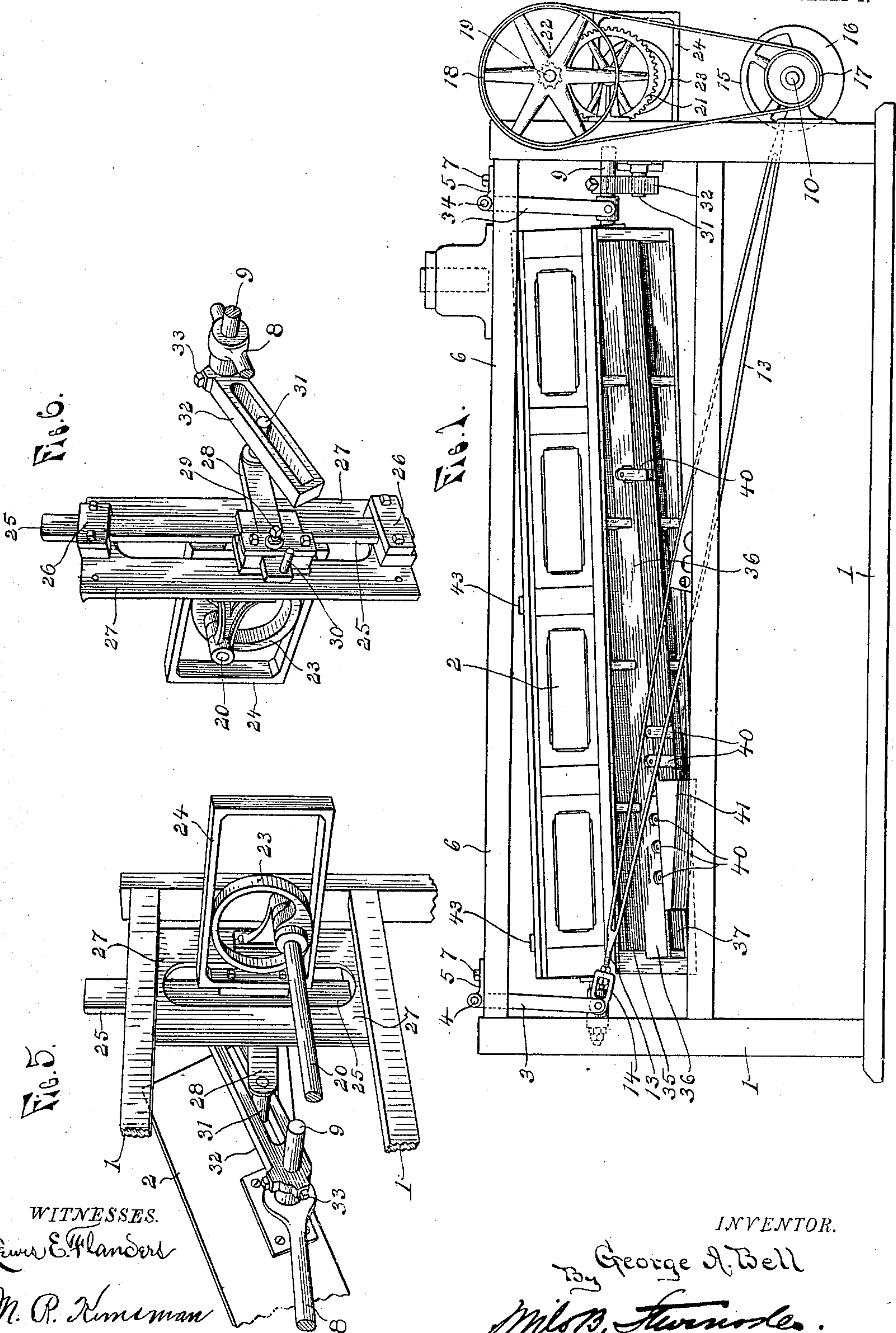
No. 871,101.

PATENTED NOV. 19, 1907.

G. A. BELL.
GRADER.

APPLICATION FILED JUNE 24, 1907.

3 SHEETS—SHEET 1.



WITNESSES.
James E. Hander
M. R. Kimmelman

INVENTOR.
George A. Bell
M. R. Kimmelman
Attorneys.

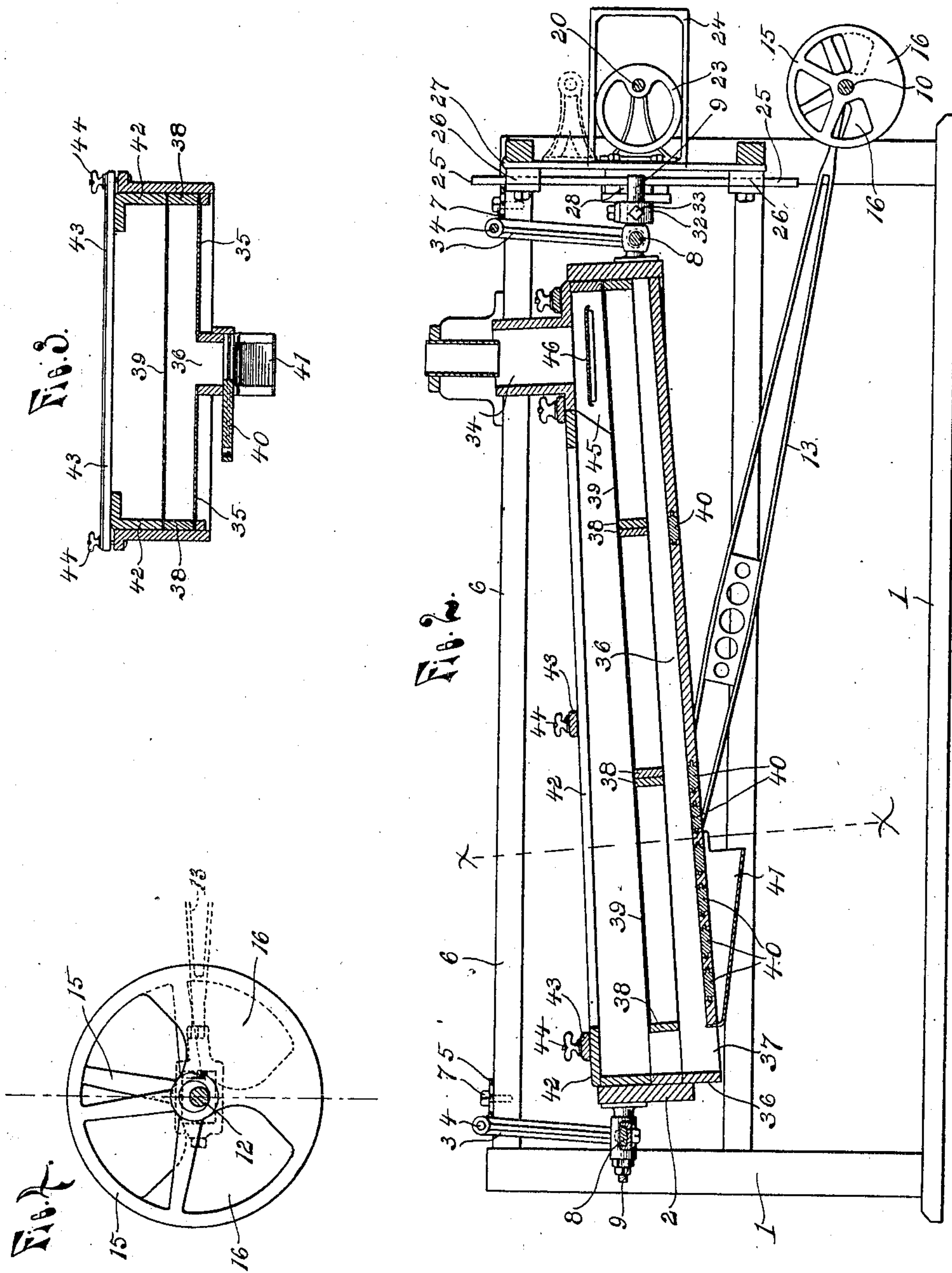
No. 871,101.

PATENTED NOV. 19, 1907.

G. A. BELL.
GRADER.

APPLICATION FILED JUNE 24, 1907.

8 SHEETS—SHEET 2.



WITNESSES.

Lewis E. Glanders
M. P. Kuneman

INVENTOR.

George S. Bell
By M. B. Stewart

Attorneys.

No. 871,101.

PATENTED NOV. 19, 1907.

G. A. BELL.
GRADER.

APPLICATION FILED JUNE 24, 1907.

3 SHEETS—SHEET 3.

Fig. 8.

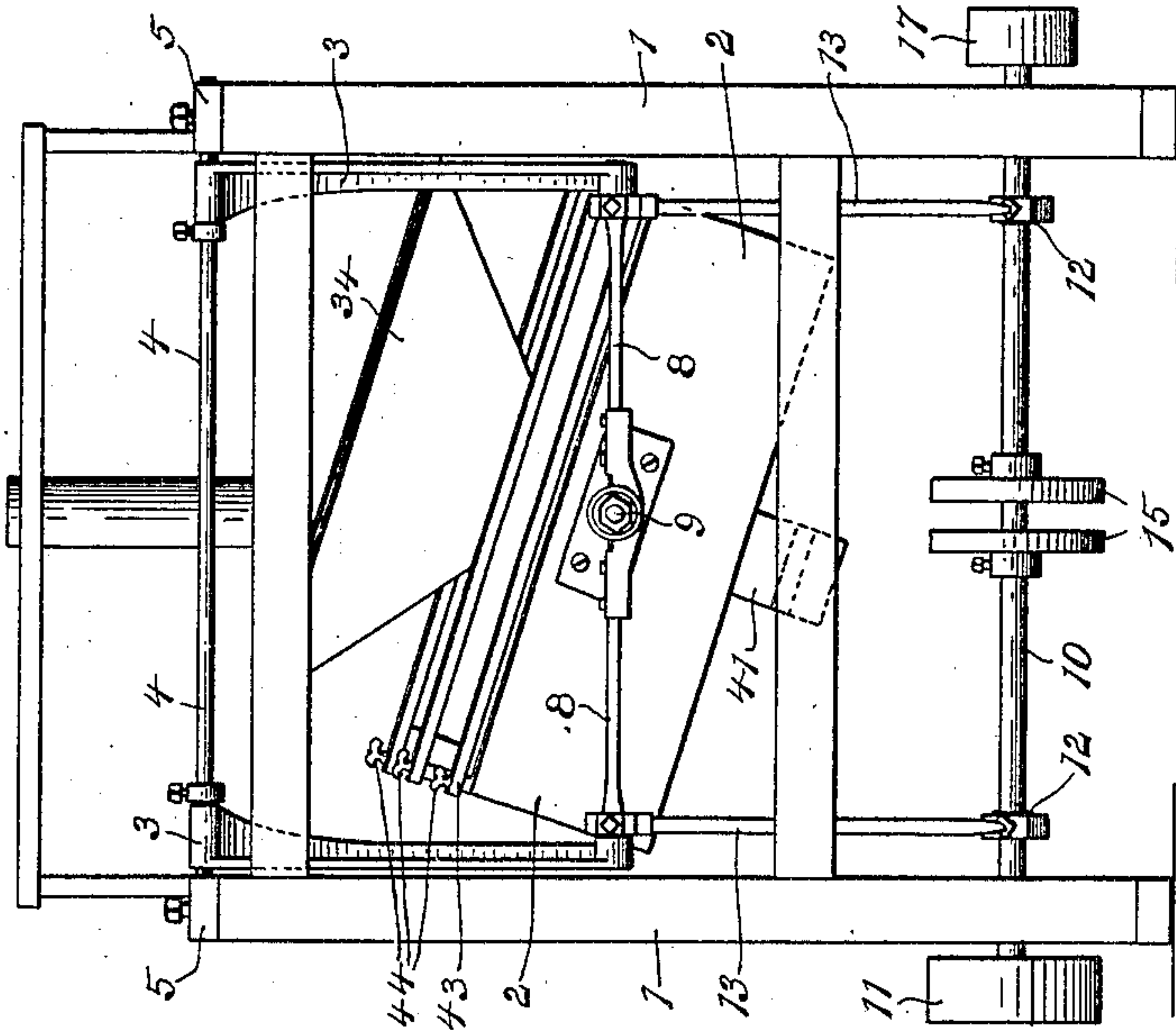
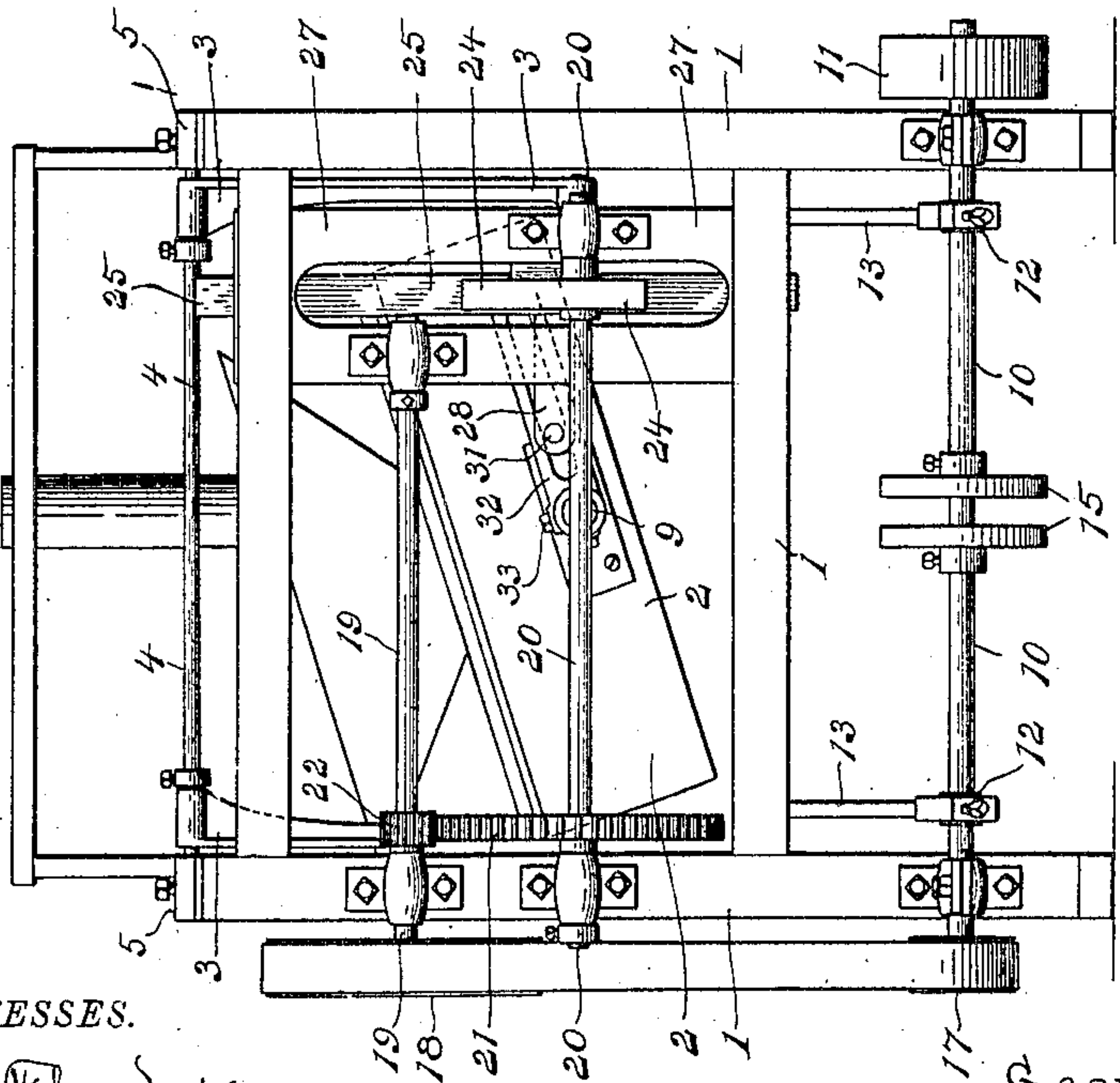


Fig. 7.



WITNESSES.

Lewis E. Blanders

M. Q. Kinsman

INVENTOR.

George A. Bell

Wm. B. Lewis

Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE A. BELL, OF AURORA, ILLINOIS.

GRADER.

No. 871,101.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed June 24 1907. Serial No. 380,587.

To all whom it may concern:

Be it known that I, GEORGE A. BELL, citizen of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented new and useful Improvements in Graders, of which the following is a specification.

This invention relates to improvements in machines commonly known as graders for dividing granular or other masses made up of units of various sizes, into masses the units of each of which are of a substantially uniform size, such as grain graders or scalp-ers, machines for sorting stone, coal, etc.; and its object is to provide a machine for the purpose which will do the work rapidly and efficiently without liability of the sieves becoming clogged and which may be adjusted to vary the number of grades and the accuracy of the work.

It is also an object of the invention to provide a machine which is so constructed that the sieves may be quickly and conveniently removed, and to provide certain other new and useful features all as hereinafter more fully described, reference being had to the accompanying drawings, in which

Figure 1, is a side elevation of a device embodying the invention; Fig. 2, is a longitudinal vertical section of the same; Fig. 3, is a section of the sieve box on the line $x-x$ of Fig. 2; Fig. 4, is a diagrammatic view of the balance wheels to illustrate their position relative to the eccentrics and to each other; Fig. 5, is a perspective detail of the box tilting mechanism; Fig. 6 is a similar view of the same looking in the opposite direction. Fig. 7 is a front elevation of the device; and Fig. 8 is a rear end elevation of the same.

In the drawings is shown a device especially adapted for use in flour mills to separate the wheat into different grades according to the size of the kernels as it passes to the reduction rolls, the different grades being passed through separate reduction machines so that all of the kernels will be properly opened, or split without being crushed or ground, but by making the device of a suitable size and providing the same with suitable screens, it may be used for grading other substances without materially changing its construction or operation.

As shown in the drawings 1 is a suitable supporting frame within which is suspended a sieve box 2 by hangers 3 secured at their upper ends to rods 4 journaled in adjustable

bearings 5 on the upper side bars 6 of the frame, said bearings being secured to the frame by bolts 7 passing through slots in the flanges of the bearings. Pivotally secured to the lower ends of the hangers at each end of the sieve box is a supporting bar 8 each provided with a bearing at its center to receive the trunnions 9 secured to the ends of said box, said trunnions being so secured to the box as to give it a downward slant toward its rear end, and thus the box is free to be moved longitudinally, being suspended by the hangers, and to be rocked laterally on its trunnions.

Mounted in bearings secured to the upright posts of the forward end of the frame, is a driving shaft 10 provided with a driving pulley 11 at one end outside the frame and with eccentrics 12 adjacent to each side of the frame, said eccentrics being connected to one end of eccentric rods 13 the opposite ends of which are pivotally attached to the supporting bar 8 at the rear of the machine, so that as the eccentrics are revolved, a reciprocating motion will be imparted to the box.

One end of each eccentric rod is screw-threaded and extends through an opening in a link 14, nuts being provided on the rod to engage the link and form a turn-buckle by means of which any slack caused by wear, etc., may be taken up to prevent pounding, and the bearings 5 for the hangers are made adjustable so that by adjusting them toward the forward end of the frame, the weight of the box may be, to a certain extent, thrown upon the eccentrics to also prevent their pounding, and give a smooth motion to the sieve box.

Secured upon the driving shaft intermediate its ends by set screws, are two balance wheels 15 each formed with a weighted portion 16 at one side to counter-balance the weight put upon the eccentric by the sieve box and give a smooth and steady reciprocating movement to said box. Each weight is sufficient to counter-balance the box but said wheels are secured to the shaft in such a manner that said weights partially counter-balance each other, the same overlapping opposite the full side of the eccentrics, in other words, the wheels are so secured to the shaft relative to the eccentrics that the weights will lie on opposite sides of a plane extending through the axis of the shaft and the axis of the eccentric at the full side of

said eccentrics, with one end of each weight extending across said plane. This brings the major portions of the weights at substantially opposite sides of the wheels where they, to quite an extent, counter-balance each other, and by adjusting them relative to each other on the shaft, their balance effect relative to the eccentric may be adjusted very accurately. The weights are thus arranged so that one of them has the effect of following the eccentric or a plane extending through its axis and the axis of the shaft to carry the eccentric over its dead center no matter in which direction the shaft is revolved.

To the end of the driving shaft opposite that upon which the driving pulley is secured, a pulley 17 is keyed, and a belt transmits motion from this pulley to a large pulley 18 on the end of a counter-shaft 19 supported in bearing brackets on the frame near its top. A shaft 20 supported in bracket bearings directly below the shaft 19, receives a slow motion therefrom by being provided with a large gear 21 in mesh with a pinion 22 on the shaft 19, and on said traverse shaft 20 near the opposite side of the frame is an eccentric 23 which engages or revolves within an eccentric frame or strap 24 secured to a vertically extending slide 25 movable vertically in bearings 26 on a suitable base plate 27 secured to the end bars of the supporting frame of the machine. On the slide 25 is an arm 28 adjustable transversely of said slide in a suitable bearing thereon and held in its adjusted position by a set screw 29, a handle 30 being provided on the arm by means of which it is moved in its bearing when the set screw is slackened. The projecting end of the arm 28 is provided with a pin 31 projecting laterally therefrom into engagement with the longitudinal slot of a slotted arm 32 which is secured by set screws 33 to the outer end of the trunnion 9 on the forward end of the sieve box.

When the eccentric 23 is turned, the slide 25 is reciprocated vertically thereby and the arm 28, moving up and down with said slide with its pin in engagement with the slotted arm 32, will rock the sieve box on its trunnions. By adjusting the said arm in its bearings, its pin is engaged with the slotted arm nearer to or farther from the trunnion or pivot on the box and thus the throw or distance which the box is rocked may be changed as desired. An intake spout is supported upon the frame 1 near its forward end to discharge into the upper end of a hopper 34 carried by the sieve box and said box is formed with an inclined sheet metal bottom 35 which is provided with a longitudinal trough 36 at its center having a discharge opening 37 at its lower end. Sieve frames 38 fit closely within the sieve box and rest upon the said bottom, the side bars of the

frames thus forming partitions in the box so that the grain falling through the holes in the sheet metal sieves 39 secured to the top of said frames, cannot pass from one to the other of said sieves but must fall into the said trough before it can pass on down the box. In the bottom of the trough a series of discharge openings are provided, closed by slides 40 any one of which may be drawn out by the operator to draw off at that point the grain passing down the trough and separate it from the grain entering said trough below that point. Any number of these slides may be provided as may also any number of screens having openings of various sizes so that the grain may be separated into as many sizes or grades as desired. The kernels which are too large to pass through any of the screens, pass over the lower end of the last screen and are discharged through the openings 37, and the grain which falls into the trough below the last slide which is open also passes out through said discharge and mingles with the grain which passes over all of the sieves. A number of slides are provided in the trough beneath the last or lower screen so that in grading rice or other grains where it is desired to grade the same very accurately the stream passing down the trough may be cut off very near the lower end of the last screen, and the grain passing through any one of these lower slides is carried back away from the discharge opening at the end of the box, by a spout 41 secured to the under side of said trough.

The sieve frames are held in place within the sieve box by a removable frame 42 which fits within said box and rests upon the top of the frames, being clamped down upon the same by cross bars 43 extending across the frame and held at each end by thumb screws 44. This removable frame is made in two sections, a short section 45 being provided at the upper end of the box to which the hopper 34 is secured so that the sieve may be removed without the necessity of removing the hopper also, and in this section below the open end of the hopper is secured a deflector 46 to spread the grain before it falls upon the sieve.

The rapid vibratory movement imparted to the sieve box by the eccentrics 12 feeds the grain toward the lower end of the box and at the same time agitates it, causing it to spread out over the surface of the screens, and the rocking motion of the box prevents the screens from becoming clogged by causing the grain to sweep rapidly across the sieves from one side to the other, thus dislodging any kernels which have become stuck in the holes, and at the same time regulates the travel of the grain towards the discharge in direct proportion to the amount of tilt imparted to the box.

Having thus fully described my invention, what I claim is:—

1. In a grader, the combination with a supporting frame, of a sieve box, trunnions on said box, hangers pivotally attached at one end of the frame, supporting bars secured to the hangers and provided with bearings to receive the trunnions, means for moving the hangers to vibrate the box longitudinally, and means for rocking the box on its trunnions.

2. In a grader, the combination with a supporting frame, of a sieve box, hangers pivotally attached at their lower ends to said box to support the same, bearings for the upper ends of said hangers adjustably secured to the frame, a shaft extending transversely of the frame, an eccentric on said shaft and an eccentric rod pivotally attached to the box at one end and to the eccentric at its opposite end.

3. In a grader, the combination with a supporting frame, of a sieve box, a shaft extending transversely of the frame, an eccentric on said shaft, an eccentric rod pivotally attached at one end to the box and at its opposite end to the eccentric, means for supporting the box adapted to permit the longitudinal vibration thereof and to cause the box to put a pressure upon the eccentric in one direction of its movement, and a balance wheel on the shaft having a weighted side at the same side of the shaft on the large side of the eccentric.

4. In a grader, the combination with a supporting frame, of a sieve box, a shaft extending transversely of the frame, an eccentric on said shaft, an eccentric rod pivotally attached at one end to the box and at its opposite end to the eccentric, hangers pivotally attached at their lower ends to said box to suspend the same in the frame, bearings for the upper ends of said hangers adapted to be adjusted longitudinally of the frame to cause the box to press longitudinally upon the eccentric rod toward the eccentric, and balance wheels provided with a weight at one side adjustably secured to said shaft with the major portions of the weights lying at opposite sides of a plane extending through the axis of the shaft and the axis of the eccentric.

5. In a grader, the combination with a supporting frame, of a sieve box, a trunnion secured to each end of said box, supporting bars provided with bearings to receive the trunnions, hangers pivotally attached to the ends of said supporting bars, bearings on the frame for said hangers, means for vibrating the box longitudinally, an arm secured to one of the trunnions, and means engaging said arm to move the same and rock the box on its trunnions.

6. In a grader, the combination with a supporting frame, of a sieve box pivotally supported thereby to rock laterally, a verti-

cally movable slide mounted in bearings on the frame, a shaft mounted in bearings on the frame, an eccentric on said shaft, an eccentric strap secured to said slide and within which the eccentric turns, and an adjustable arm carried by the slide to rock the box and adapted to be adjusted to vary the distance which the box will be tilted.

7. In a grader, the combination with a supporting frame of a sieve box, trunnions on the ends of said box to pivotally support the same, a slotted arm secured to one of said trunnions, a vertically movable slide mounted in bearings on the frame, a horizontally extending arm adjustably secured to said slide and engaging the slot in the slotted arm, and means for moving the slide vertically.

8. In a grader, the combination with a supporting frame, of a sieve box, trunnions on the ends of said box to pivotally support the same, a slotted arm secured to one of said trunnions, a shaft mounted in bearings on the frame, an eccentric on said shaft, a vertically movable slide mounted in bearings on the frame, an eccentric strap secured to said slide and within which the eccentric turns to move the slide, a horizontally extending arm mounted in a bearing on the slide and adjustably secured therein, and a pin on the end of said arm to engage the slot in the slotted arm.

9. In a grader, the combination with a supporting frame, of a sieve box supported by said frame and adapted to vibrate longitudinally and to rock laterally, means for vibrating and rocking said box, a trough provided with discharge openings in its bottom, formed in the bottom of said box and extending longitudinally thereof along its centerline, sieve frames having sides extending transversely of the bottom and resting thereon to form dividing walls between the sieves, sieves secured to the upper edges of said frames, and slides to close the discharge openings in the bottom of the trough.

10. In a grader, the combination with a supporting frame, of a sieve box supported by said frame, and adapted to vibrate longitudinally and to rock laterally, means for vibrating and rocking said box, an inclined bottom in said box having a discharge opening at its lower end, a trough formed in said bottom along its center line and provided with discharge openings in its bottom at intervals, slides to close said openings, sieve frames fitting within the box and resting upon the bottom of said box with their side bars extending across the box and forming dividing walls between the sieves, sieves secured to the upper edges of the frames with their upper surfaces all extending in the same inclined plane, and a securing frame fitting within the box and engaging the sieve frames to hold the same in place.

11. In a grader, the combination with a supporting frame, of a sieve box supported in a longitudinal inclined position of said frame, trunnions secured to the ends of said box, bearings for the trunnions, hangers to support the bearings, means for rocking the box on its trunnions, detachable sieve frames supported within the box, sieves secured to said frames with the upper surfaces of said sieves forming a plane inclined toward the lower end of the box, a trough formed in the bottom of said box and providing the sole means of communication be-

tween the sieve frames, said trough being formed with a series of discharge openings in its bottom, slides to close said openings, and a hopper to discharge into the upper end of the box upon the screens.

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

GEORGE A. BELL.

Witnesses:

H. G. BATCHELOR,
E. H. HUGHES.