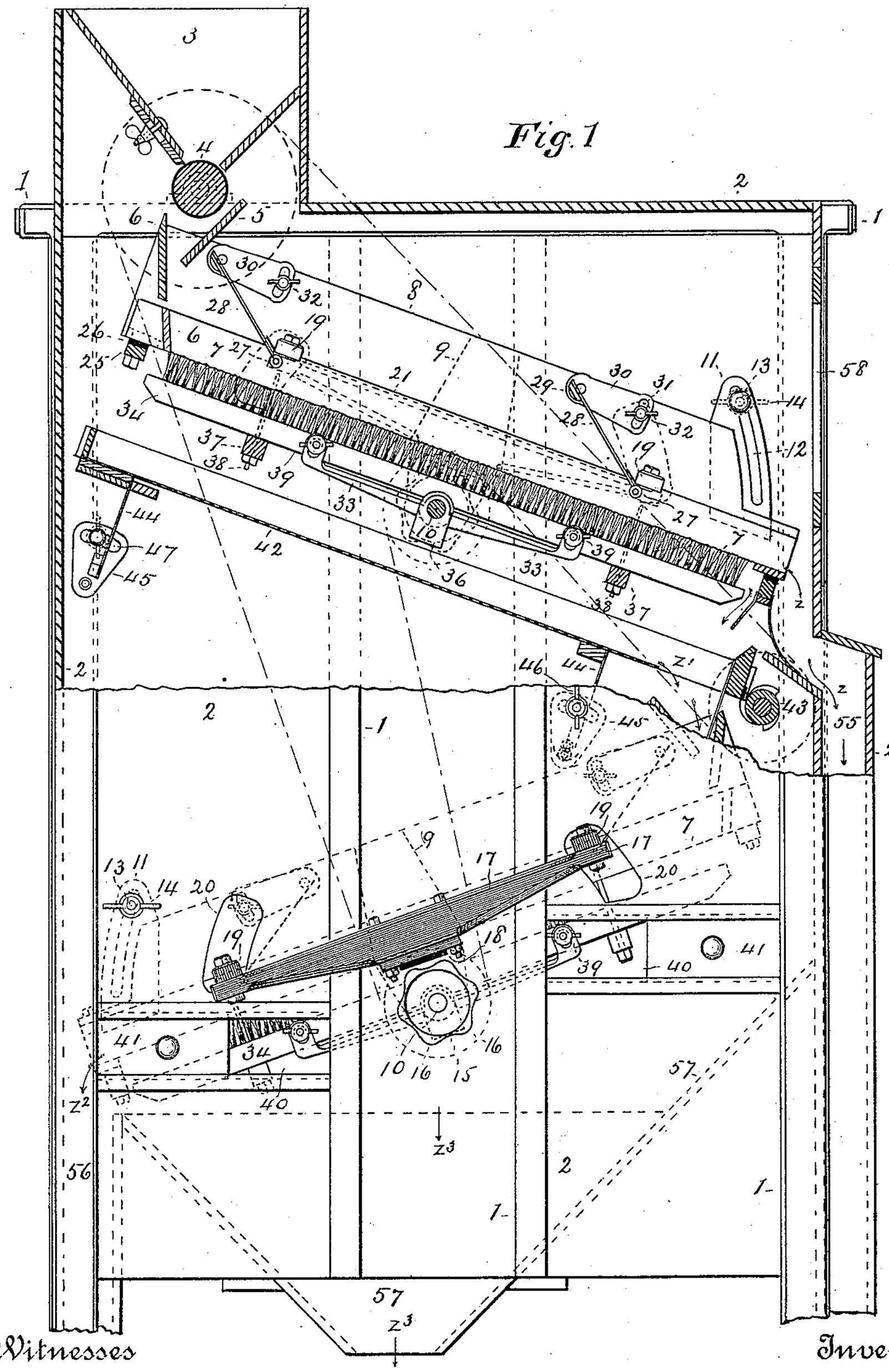
(No Model.) 3 Sheets—Sheet 1.

W. J. FENDER.

MIDDLINGS GRADER.

No. 465,924. Patented Dec. 29, 1891.

Fig. 1



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(No Model.) 3 Sheets—Sheet 2.

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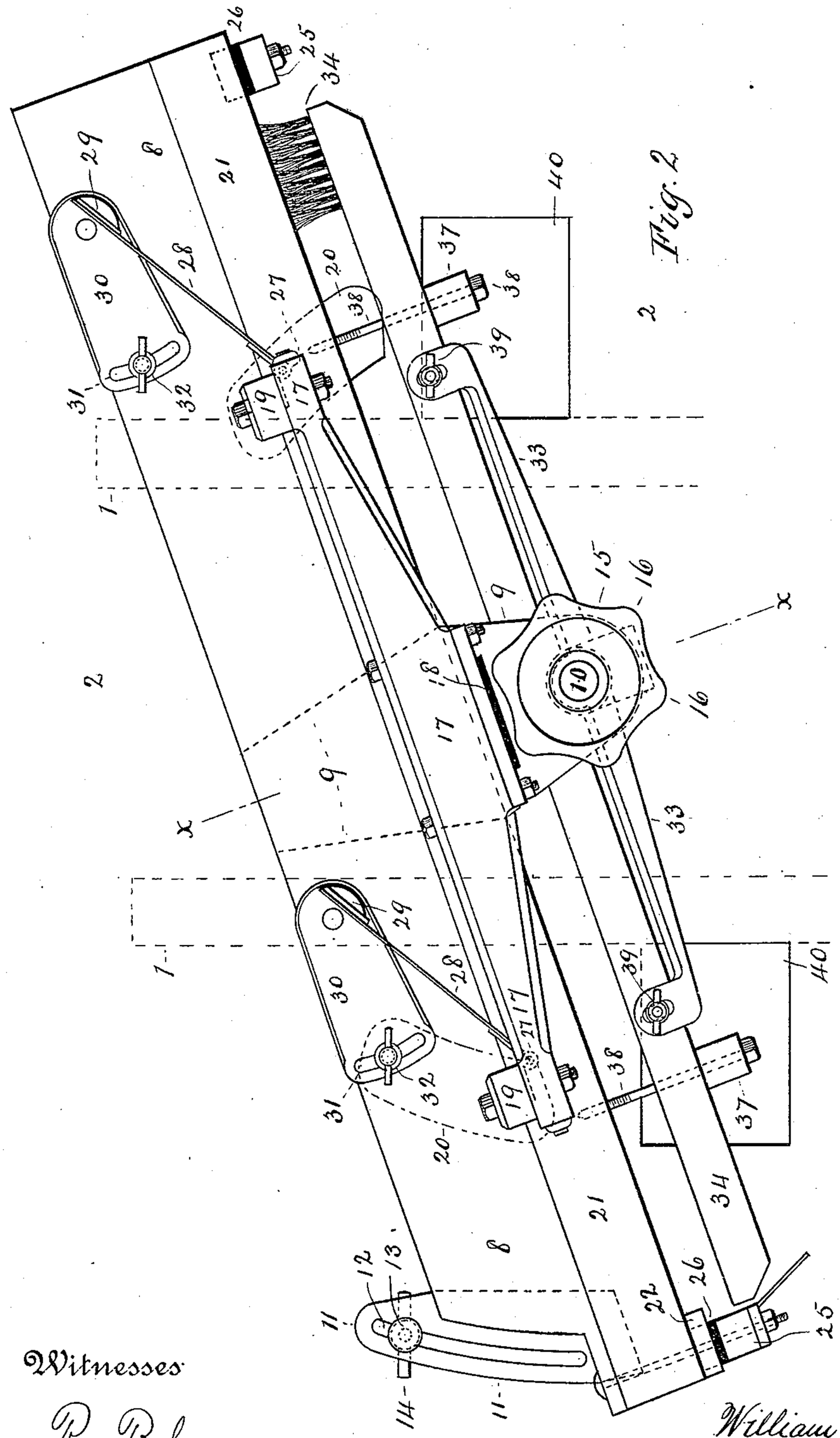

Fig. 2

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Fig. 3

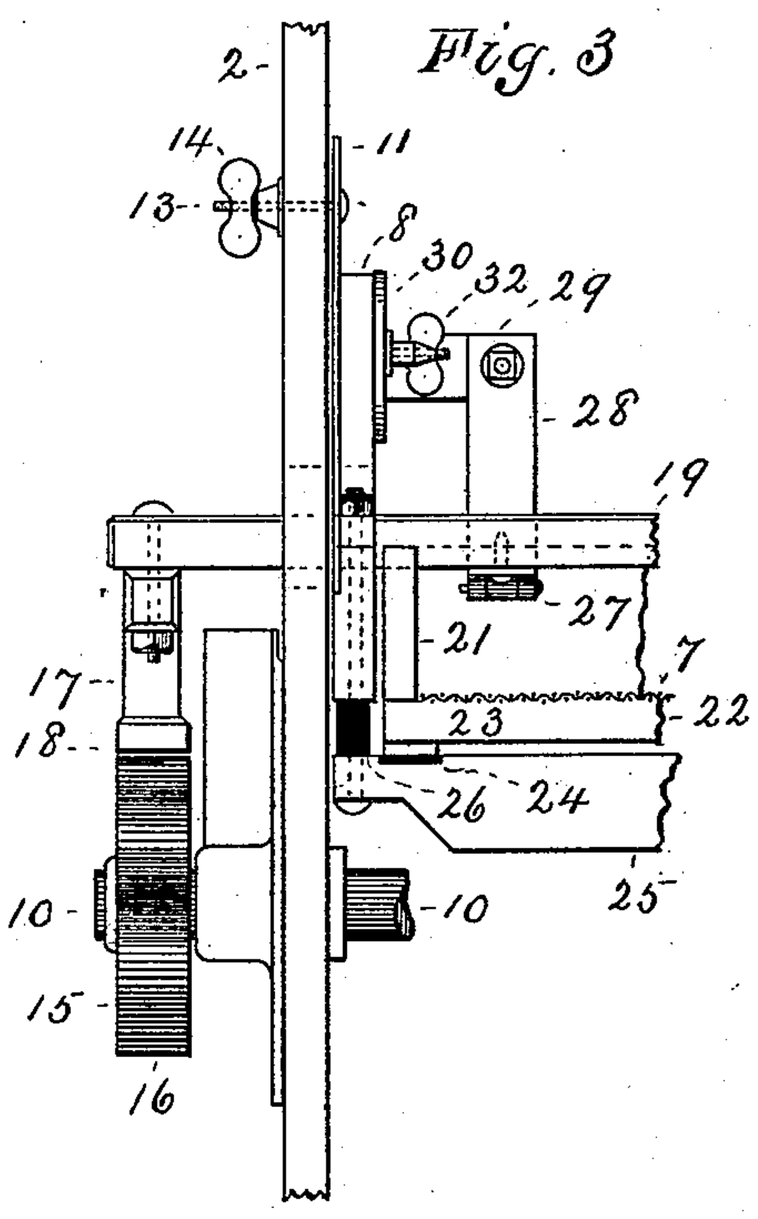
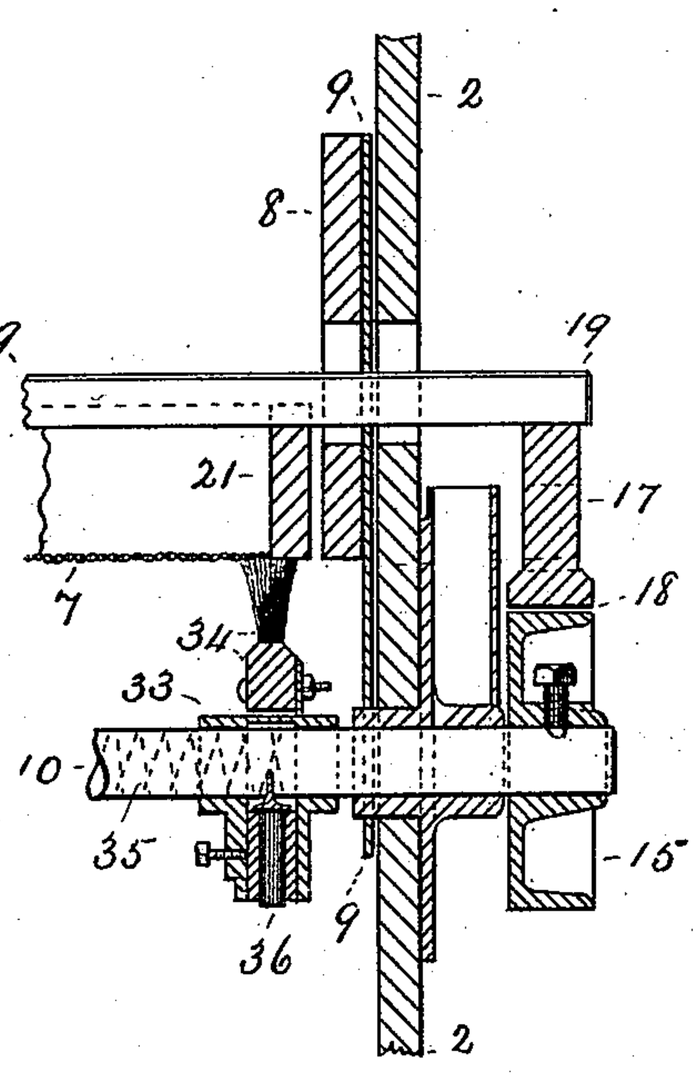


Fig. 4



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UNITED STATES PATENT OFFICE.

WILLIAM J. FENDER, OF MINNEAPOLIS, MINNESOTA.

MIDDLINGS-GRADER.

SPECIFICATION forming part of Letters Patent No. 465,924, dated December 29, 1891.

Application filed May 14, 1891. Serial No. 392,676. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. FENDER, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Middlings-Graders, of which the following is a specification.

My invention relates to machines designed to separate flour and other fine particles from middlings and similar products of the rolls used in flour-mills and to separate such products into grades.

It is the object of my invention to organize a convenient and simple machine having shaking sieves placed in inclined position, with means for readily varying their inclination and brushes for cleaning the sieves, all of said devices being arranged to swing on common centers and independent of the casing of the machine, so that the adjustment of these parts can be effected at one operation from the outside of the machine. This object is accomplished by means of the devices illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation showing the exterior of the lower portion and interior of the upper portion of a machine embodying my improvements. Fig. 2 is a side elevation of the adjustable sieve-frame and brush-carrier. Fig. 3 is an end view from the rear of the machine of the devices shown in Fig. 2, and Fig. 4 is a section on the line *x x* of Fig. 2.

In said drawings, 1 designates the frame-pieces, and 2 the housing, of the machine.

At the top of the machine is provided a hopper 3 and a feed-roll 4 or other feed device for introducing material to the machine. Suitable cant-boards 5 and 6 serve to direct the material to the upper sieve 7.

In the machine illustrated two oppositely-inclined sieves or screening mediums 7 are used. It will be obvious, however, that one, two, three, or more such screening mediums may be used, as convenience may require. The screening medium 7 (preferably of bolting-cloth) is carried at the under side of a frame 8, within but entirely free from the casing of the machine. This frame is attached to a plate or bracket 9, that is loosely mounted on a shaft 10, so as to enable the frame to be tilted on the shaft as an axis. To one of the ends of each of the side boards of the frame 8 is attached a plate 11, in which is a suitable curved slot 12, and through this slot and through the casing 2 of the machine extends a bolt 13, on the outer end of which is a thumb-nut 14. This arrangement enables the frame to be tilted on its axis and to be held in adjustment by the manipulation of the thumb-nut to vary the sieve inclination. Obviously the same result could be reached by having the bolt screwed to the sieve-frame and extending through a slot in the machine-casing.

On the shaft 10 at the outside of the casing is a cam-wheel 15, having a series of projections 16 for vibrating the sieve at such intervals as may be required to give it the desired vibrating motion. Above this cam-wheel is a yoke or truss 17, having at its under side a piece 18, of leather or other durable material, with which the projections of the cam come in contact as the cam-wheel is rotated. This strip 18 is held free from the cam-wheel when the sieve is at its lowest position, as shown in the drawings. To the ends of the yoke 17 are secured bars 19, which extend transversely through the machine from the yoke at one side to that at the opposite side, the casing being provided with slots 20 to enable the transverse bars to have free play when the devices are tilted on their axes. To these bars 19 are attached the side pieces 21 of the sieve-frame, and to the under edges of the ends of these side pieces are secured the end strip 22 of the sieve-frame. This frame is preferably provided at its corners with small pieces 23, of leather or other suitable material, which, when in their lower position, are in contact with blocks 24, of rubber or other elastic devices, secured on the cross-pieces 25 of the frame 8. These cross-pieces 25 are bolted to the frame and suitable rubber or other elastic devices 26 are interposed between them, so that they may be screwed up to lift the sieve-frame so as to vary the throw of the sieves produced by the cam-wheel.

The transverse bars 19, carrying the sieve-frame, are connected by hinges 27 to elastic or other suitable hangers 28 held by brackets 29. These brackets project from plates 30,

that have one end pivoted to the frame 8 and the other provided with a slot 31 and a thumb-screw 32, by which means they can be turned on their axes to regulate the tension of the hangers. As these hangers are placed in diagonal position relative to the sieve, as shown, and as the lift of the eccentric is vertical in direction, the vibratory motion of the sieve-frame, as will be obvious, would be a curved movement, and the motion of both ends of the sieve would be the same. Upon the rotation of the cam-wheel each of its projections serves to lift the yoke and frame carrying the sieve, and immediately upon disengagement of the cam-wheel projection the hangers 28 permit the sieve to fall back to its lowest or normal position. The cam projections being numerous and the rotation relatively rapid, quick vibrations are imparted to the sieve, and as the vibrations are in a slightly curved course their tendency is to carry the material toward the tail of the sieve. On the same shaft 10 is provided a brush-carrier 33, supporting a brush and its stock 34. This shaft within the machine is provided with right and left threads, (indicated by dotted lines 35 in Fig. 4,) and the carrier is provided with a suitable device 36 for engaging the threads to cause the carrier to reciprocate transversely in the machine. The brush-stock 34, in order to keep it in proper position relative to the cloth, may be guided on transverse bars 37, that are attached by bolts 38 to the frame 8, and by means of the bolts the bars can be adjusted as to distance from the frame. The ends of the carriers 33 are provided with thumb-nuts 39 or other adjusting devices for raising or lowering them. By these means the pressure of the brush on the cloth can be regulated as desired. Access to these bars and nuts 38 and 39 can be had through openings 40, cut in the casing of the machine and provided with sliding doors 41.

Immediately below the upper sieve is a vibrating return board 42, operated by means of a cam 43. The board is supported on springs 44, and the springs are carried by pivoted plates 45, that may be adjusted to vary the tension of the springs by means of thumb-nuts 46 exterior to the machine for operating bolts extending through the casing and through slots 47 in the plates 45. The movement of the cam 43 is against the pressure of the springs, and the latter throw the return board toward the cam when disengaged from the cam-surface. The material delivered by the return board 42 falls upon a second sieve 7, the operation of which is identical with that described for the upper sieve.

The operation of the machine is probably apparent from the foregoing description. Material is fed onto the head of the upper sieve 7, and the cam-wheel, being in rotation, the sieve is given a movement by means of the cam projections and the hangers 28, which serves to shake the material on the surface of the sieve and to advance it toward the tail. The rotation of the shaft 10 serves to cause the brush to reciprocate transversely and sweep the under surface of the sieve. The tailings from this sieve pass, as indicated by the arrow z, to a spout 55 to be conducted away. The material passing through the sieve falls upon the vibrating return board 42, and passes thence, as indicated by arrows z', to the lower sieve 7. This sieve, being operated in the same manner as the upper one, delivers its tailings, as indicated by the arrow z^2, into a spout 56, while the finer material, passing through the sieve, falls, as indicated by the arrow z^3, into a hopper 57. The sieves used may be of the same or different mesh, as desired.

The construction of the devices described enables the carrying-frame, the screening medium and its frame, and the brushes and the devices connecting their carriers to be tilted on the shaft 10 and adjusted as to inclination by merely operating the thumb-nuts 14 and raising or lowering the end of the sieve by hand. Access to the sieve for this purpose is had through a door-opening 58 in the end of the machine, and while all of the operative parts are inclosed within and are free from the casing of the machine access can be had to the several bolts and adjusting devices through the slots provided in the casing.

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

1. In combination, a sifting medium, a rotating shaft on which both the sifting medium and its cleaning devices are pivotally supported and are simultaneously adjustable to corresponding inclinations, and means provided on the shaft for shaking the sifting medium and operating its cleaning devices.

2. The combination, with a suitable casing, of an adjustable frame therein, a sifting medium suspended within the same, a brushing device therefor, a shaft constituting a common axis on which all of said devices are arranged to turn, means for correspondingly varying the inclination of all of said devices by tilting said frame, and means for causing the rotation of the shaft to shake the sifting medium independently of the said frame and casing, substantially as set forth.

3. In combination, a frame adjustable on an axis within a casing or frame, a sieve hung on the same axis and swinging with the adjustable frame to vary the sieve inclination, inclined hangers connecting the sieve and frame and rigidly secured to the one and hinged to the other, and a device operating on said axis for intermittingly lifting the sieve, for the purpose set forth.

4. A rotating shaft provided with cam projections, a sieve having rigid connections with a device acted upon by the cam projections, a frame adapted to turn on the shaft, and yielding connections between the sieve and

such frame permitting vibrations of the former, whereby the inclination of the sieve can be changed without affecting its vibration by the cams.

5. A frame pivoted on an axis, a sieve connected thereto by elastic inclined hangers having downward tension, a brush and adjustable carrier therefor reciprocating on said axis, a housing for all of said parts, cams on the shaft exterior to the housing, and connections operated by the cams to lift the sieve at intervals, all of said parts being arranged to swing together to simultaneously vary their inclination to the shaft without changing their relation to the cam, substantially as set forth.

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