(No Model.)

4 Sheets—Sheet 1.

A. WIGGIN.

MALTING MACHINE.

No. 416,769. Patented Dec. 10, 1889.

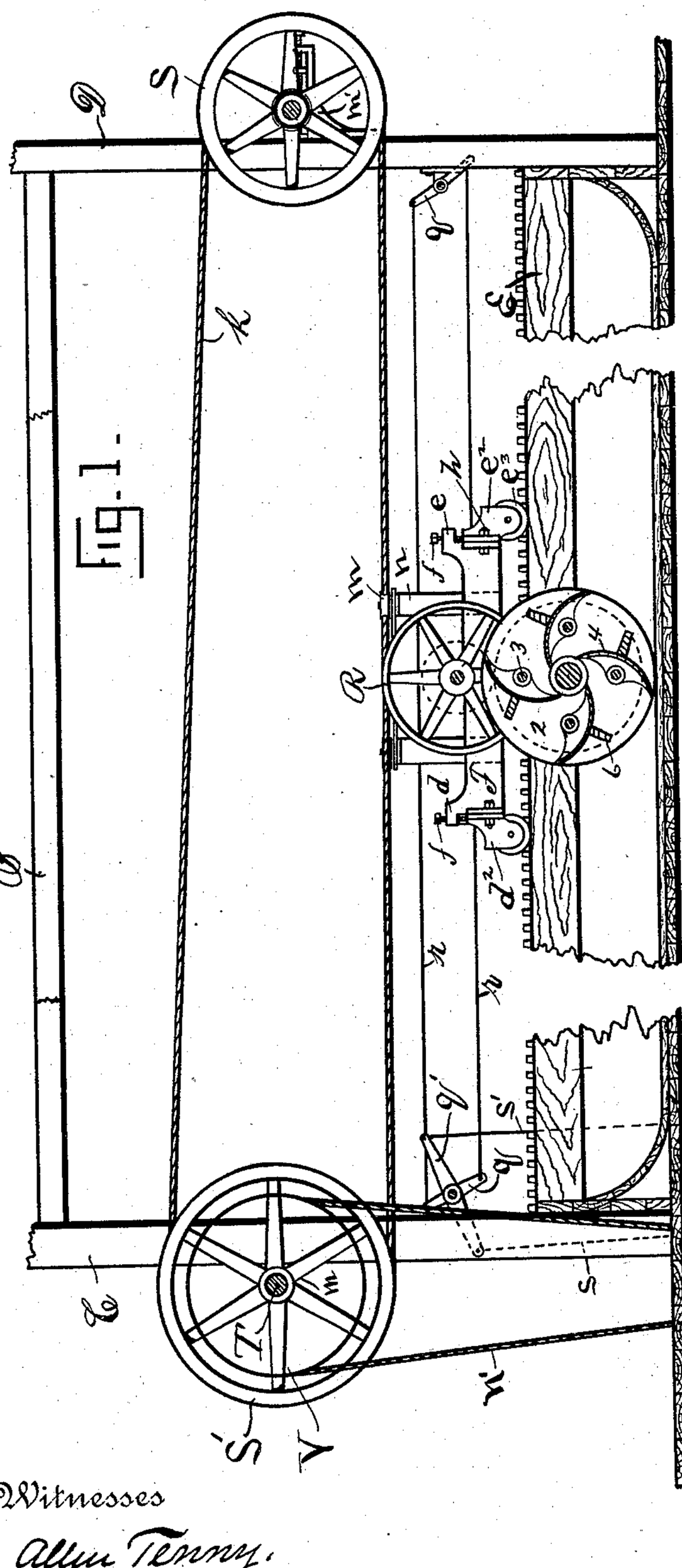

Fig. 1.

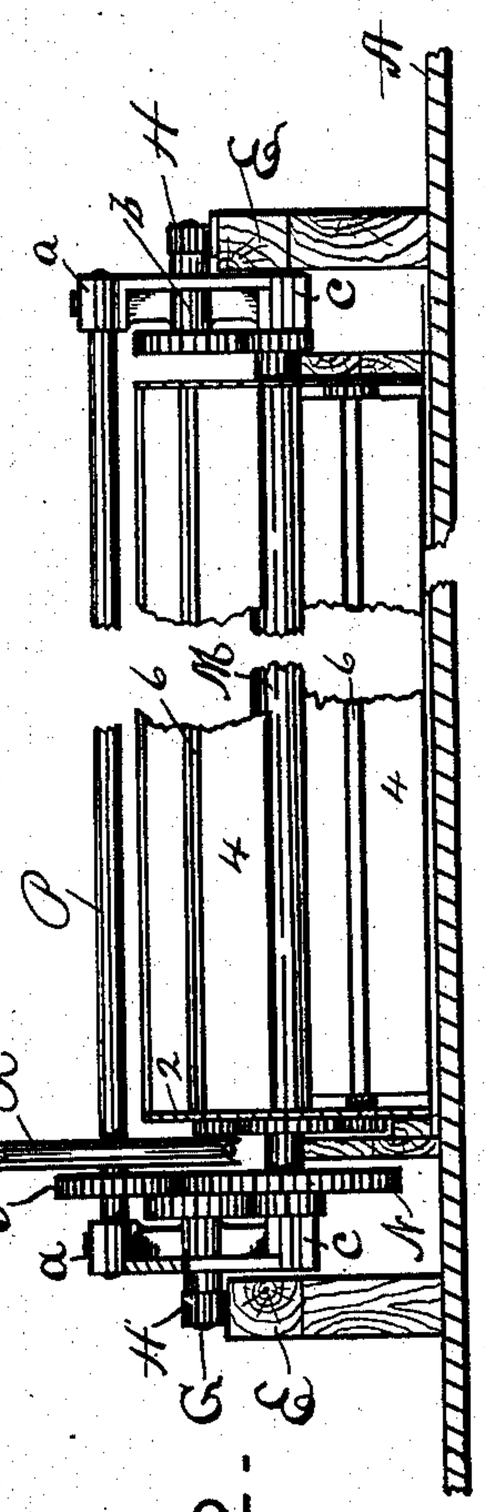

Fig. 2.

Witnesses

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MALTING MACHINE.

No. 416,769. Patented Dec. 10, 1889.

Fig. 3.

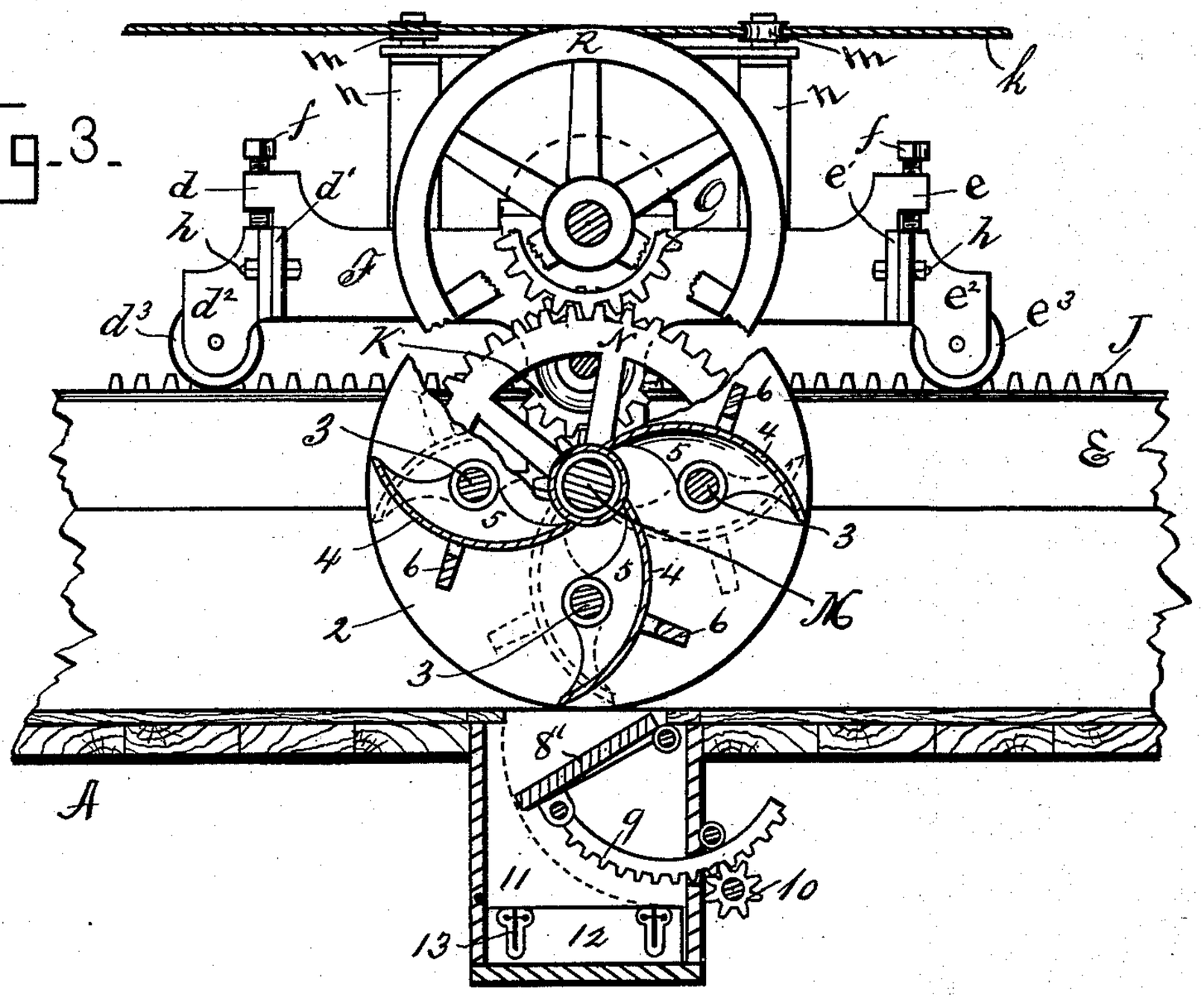
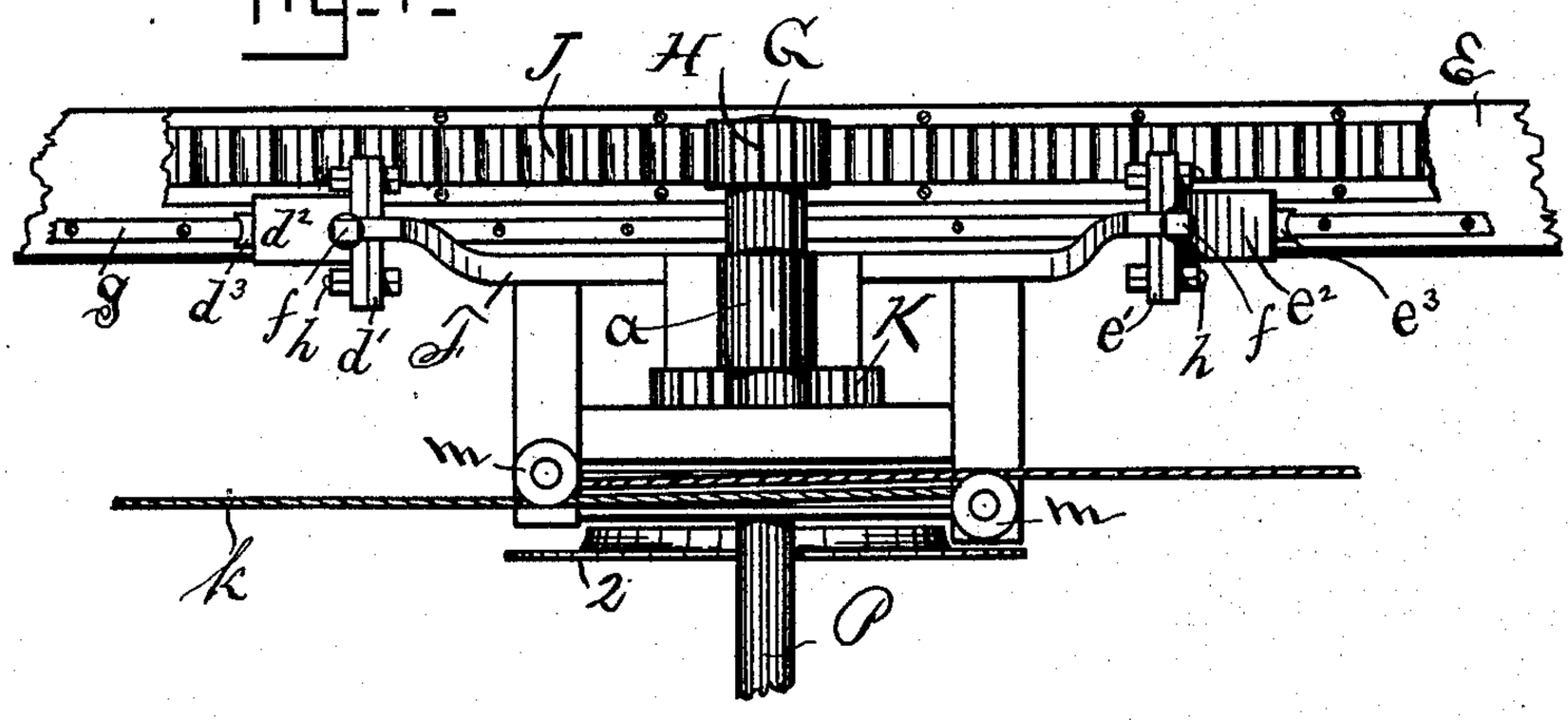


Fig. 4.



Witnesses

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4 Sheets—Sheet 3.

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MALTING MACHINE.

No. 416,769. Patented Dec. 10, 1889.

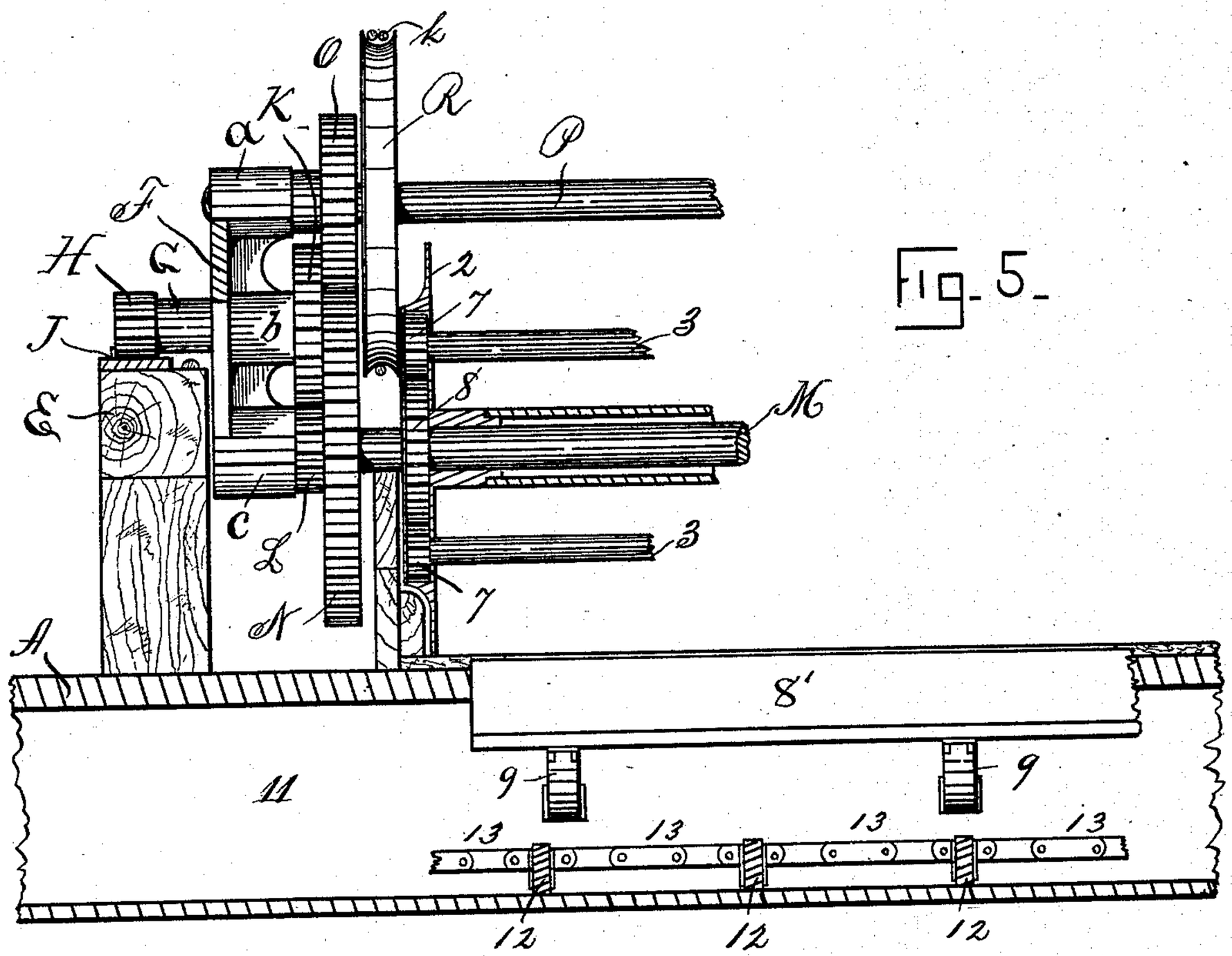

FIG. 5.

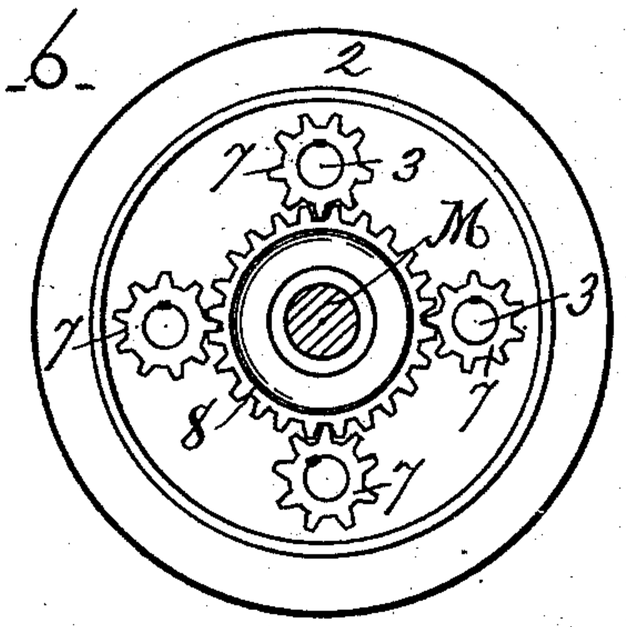

FIG. 6.

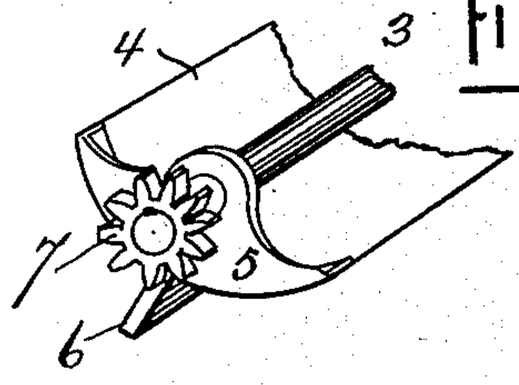

FIG. 7.

Witnesses

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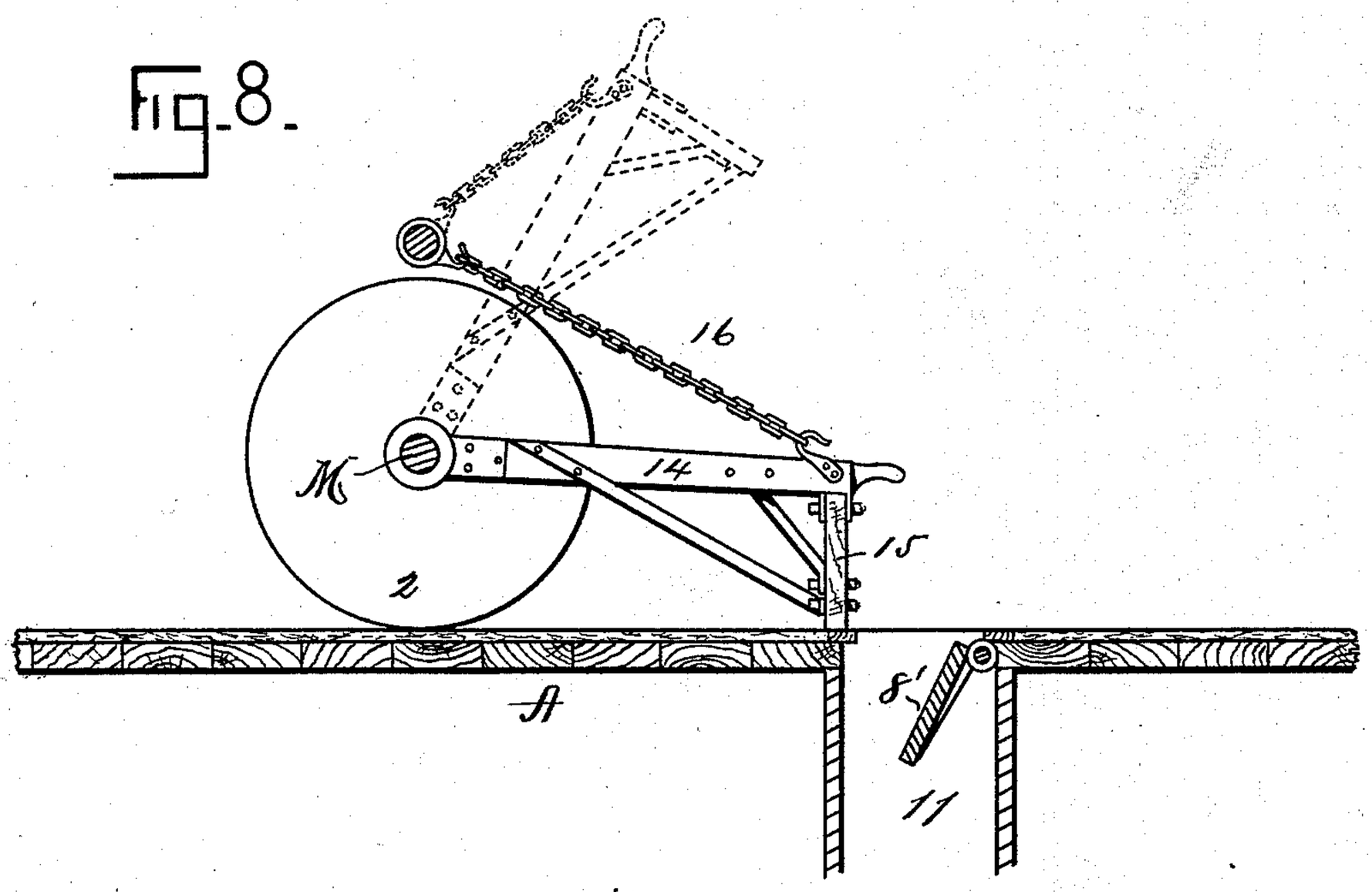
(No Model.) 4 Sheets—Sheet 4.

A. WIGGIN.

MALTING MACHINE.

No. 416,769. Patented Dec. 10, 1889.

Fig. 8.



Witnesses

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UNITED STATES PATENT OFFICE.

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MALTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 416,769, dated December 10, 1889.

Application filed February 25, 1889. Serial No. 301,131. (No model.)

To all whom it may concern:

Be it known that I, ANDREW WIGGIN, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Malting-Machines, which improvements are fully set forth and described in the following specification, reference being had to the annexed four sheets of drawings.

This invention has particular relation to machines for automatically handling barley or other grain during the process of germination or while said grain is drying, the immediate object being to provide a form of stirrer or agitator that shall be more effective than those now in use; also, to improve various details of construction in such machines to the end that they may be more easily operated and the grain more readily and cheaply handled.

In malt-making during the period of germination there is a constant tendency on the part of the fine rootlets that put forth to become intertwined and form a matted mass of the entire body of grain. To prevent this result it is absolutely necessary that said grain should be frequently distributed and broken up and the individual particles of grain separated. The agitating device, which forms an essential feature of this invention, is constructed with particular reference to this desirable result.

In the annexed drawings, Figure 1 is a side elevation, partly in section, of a malting-machine embodying the major portion of my improvements. Fig. 2 is an elevation of portions of the agitator as viewed from the left-hand end of Fig. 1, and is intended to illustrate the manner of supporting and rotating said agitator. Fig. 3 is an enlarged cross-section of said agitator, showing its driving mechanisms, and also illustrates a convenient form of trap-door and conveyer for removing the grain from the malting-floor. Fig. 4 is a top view of Fig. 3. Fig. 5 is a cross-section of one side of the malting-chamber, showing more clearly my preferred construction of agitator-frame, and also shows said conveyer. Fig. 6 is an end view of an agitator in which the several buckets or scoops are geared together and thus caused to reverse in unison. Fig. 7 is a perspective view of a portion of one of said scoops and the shaft on which it is supported. Fig. 8 is a detail view showing the scraper in its operative position in the malting-chamber.

My several improvements may be used within a closed chamber or may be adapted for use on the open floor of an ordinary room, as illustrated in Fig. 1 of the annexed drawings.

I prefer to use for drying-machines a closed chamber with a perforated floor, through which currents of tempered air may be passed, and for germinating-machines either an open or closed chamber and a solid cement floor.

Referring to said drawings, the letters A B indicate the floors of a building, and C D uprights connecting said floors and located at each end of the malting-chamber proper. Similar uprights are provided at each corner of said machine and are connected by girders or stringers E, that form ways on which the agitating device is supported and travels forward and backward while in use. Cast-metal frames F are provided at each end of said agitating device, having journal-bearings *a b c* formed therein, and having laterally-projecting arms *d e*, carrying machine-screws *f*, that are vertically adjustable. The ends of said arms *d e* are formed with right-angular extensions or plates *d′ e′*, and on the outer face of said plates are clamped corresponding plates formed as parts of frames d^2 e^2, which latter frames have pivoted therein rollers d^3 e^3, that may rest directly on the girders E, or, if preferred, may run on a track of half-round iron *g*, as illustrated in Fig. 4 of the drawings. The confronting plates on frames *d e* and on frames d^2 e^2 are drilled to receive a clamping-bolt *h*, the bolt-hole in one of said parts being elongated, so that a considerable vertical adjustment is possible, it being only necessary to loosen the nut or bolt *h* and raise or lower the screws *f* to control such adjustment. This action correspondingly raises or lowers the entire agitating device.

Journaled in the central bearings *b* of frames F at each end of the agitator are short shafts G, that bear on their outer ends

small spur-gears H, that engage racks J, secured to upper side of guides E and parallel with the half-round-iron track *g*. On the inner end of each shaft G is a gear K, somewhat larger than the spur-gears H above mentioned.

Hung in the lower bearings *c* of frames F is a shaft M, on which the agitator proper is supported. At each end of this shaft M is a gear L, that meshes with the gears K, already described. At one end of shaft M (the left hand of Fig. 2) is also a somewhat larger gear N, that meshes with a gear O, carried by a shaft P, that rotates in the bearings *a* of frames F. On this shaft P is also a score-pulley R, adapted to receive one or more coils of a driving-cable *k*, said cable being suitably guided on each side of score-pulley R by small score-pulleys *m*, revolving in a horizontal plane and supported on pillars *n*, projecting upward from frames F.

The cable *k* is carried by drums or pulleys S S′, located at the ends of the malting-chamber and supported, preferably, in journal-bearings *m′*, secured to the uprights C D, said journal-bearings at one end of the chamber being made adjustable, so that the slack of said cable may be easily taken up. On the shaft T, that carries the pulleys S′, is also a pulley V, which is connected by belt or cable *n′* with a pulley V′ on a counter-shaft W, located either beneath the floor A, as here shown, or overhead, as is most convenient. This counter-shaft W is driven by straight and crossed belts *o o′*, operating with suitable pulleys on said counter-shaft, said belts being controlled by a shipper *p*. The arrangement of counter-shaft, connecting-belts, and shipper we make no special claim to, and therefore have not deemed it necessary to show detailed drawings of the same. Shipper-rod *p* is controlled and caused to reverse the movement of the agitating mechanism at stated times by a system of cords, levers, and pulleys, which I will proceed to explain. At each end of the malting-chamber a lever-arm *q* is pivoted, the ends of said lever-arm being connected by cords or chains *r* extending from end to end of said chamber. The lever *q* nearest the counter-shaft W has also attached thereto a cross bar or arm *q′*, whose ends have cords or chains *s s′* leading downward around a system of pulleys *t t′* and connecting with said counter-shaft at its opposite ends in such a manner that when the cross-bar *q′* is tilted or rocked on its pivot said cords or chains *s s′* cause the shipper-rod to move longitudinally, and thus move the belts *o o′*. To effect this transfer of the belts at the proper time, the lever-arms *q* are of such length and so located relative to the frames d^2 e^2, above described, that said frames engage one end of said lever-arms as the agitator has nearly reached the end of the chamber. This rocks the lever-arm *q′* and its connected parts, and thus reverses the direction of rotation of the driving-cable *k*, and consequently reverses the movement of the agitating device before it reaches either end of the malting-chamber.

I am aware that agitating devices drawn and rotated by cable mechanisms and adapted to reciprocate in a malting-chamber are old and commonly known in this class; but the particular arrangement of cable, shafts, gears, and racks here shown, by means of which both the reciprocating and rotary movements of the agitator are attained, are believed to be novel.

It should be noted that the cable *k* does not serve directly to either rotate the agitator or cause it to advance and recede in the malting-chamber, but simply acts to rotate the shaft P, which is journaled in the main frames of the agitator. The rotary motion of this shaft P is then transmitted through the train of gearing already described and utilized to rotate the agitator, and also to rotate the gears that mesh with rack J, and thus cause said agitator to travel forward and backward, as desired. The distribution of power and motion thus provided is more satisfactory in practice than when the agitator is drawn forward by cables located at each end of said agitator and connected directly therewith. When so connected, a slight variation of the tension or length of such cables causes one end of the agitator to move slightly in advance of the other end, and as a result the supporting-carriages of the agitator bind in their bearings. This difficulty is positively avoided by the mechanism herein described and a steady movement of the agitator attained.

The agitator proper consists of a novel arrangement of buckets particularly suited to this class of machines.

I have already referred to the agitator-shaft M, supported in bearings *c* in frames F. This shaft has secured to it circular plates 2, which are drilled at stated distances from the central shaft to provide bearings for a series of shafts 3, on which the buckets of my agitator are hung. These buckets consist of curved plates 4, forming scoops that are approximately semicircular in cross-section and supported on the shafts 3 by wings or plates 5. The location, size, and shape of the buckets are such that when they are rocked on shafts 3 one edge of said buckets abuts the central shaft M, while the other edge projects outward to the perimeter of the plates 2 and nearly reaches the floor as the agitator rotates. It will be thus seen that the buckets so constructed and supported may be rocked on their shafts 3 to bring either edge into operative relation to the mass of grain, as indicated by dotted lines in Fig. 3, and are thus made to serve as scoops while traveling in either direction. To effect the reversal of said buckets, I provide on each a rib 6, that projects radially from the perimeter of said bucket. When the direction of movement of the entire agitator is reversed at the end of said chamber, these ribs 6 plow into the grain which accumulates on said ribs and tends to

hold them in check while the agitator advances. This reverses the buckets, and they immediately begin to scoop up the grain and deposit it in the rear of the agitator. This form of buckets allows the grain to drop freely from the rear side and overcomes some of the objections heretofore existing in agitators provided with rigid buckets adapted to scoop up the grain when moving in either direction—for example, as in Patent No. 240,624.

In order to cause the simultaneous reversal of all the buckets of the series, instead of waiting for each to be acted on by the grain, I provide on one end of each shaft 3 a spur-gear 7, which spur-gears mesh with gear 8, loosely located on the central shaft M. When either of the buckets is reversed, this system of gears (plainly shown in Figs. 2 and 6) immediately reverses all the companion buckets, and thus brings them into position for immediate use.

In Figs. 3 and 5 I have illustrated a convenient form of conveyer for removing the finished malt from the drying-chamber and conveying it to other parts of the malt-house. A trap-door 8′ is hinged to floor A at about the middle of the drying-chamber, said trap-door being raised or lowered by means of a rack 9, attached to said trap, and a pinion-gear 10, journaled in proper relation to said rack and operated by a crank or wrench. (Not shown in the drawings.) The trap-door 8′ opens into a box or trough 11, that is transverse to the length of the drying-chamber and of any desired length. In the bottom of this box 11 are scrapers 12, that are connected near their ends by chains 13, forming a continuous chain or belt carrying a series of scrapers arranged at stated distances apart and supported by sprocket-wheels in a manner common to this class of devices. When it is desirable to remove the contents of the drying-chamber, this conveyer is set in motion and the trap-door 8′ is opened. The grain is then scraped or shoveled through the opening thus provided and falls on and between the scrapers 12 and by them is conveyed to the point where the chain or belt passes around the sprocket-wheels, when it is either deposited in a bin or falls into a chute and is carried by gravity to another part of the building.

To facilitate the emptying of the drying-chamber, I have also provided a scraper within said chamber, consisting of arms 14, that are journaled on the agitator-shaft M at each end of said shaft and bear at their free ends a plate 15, that may rest on the malting-floor and be drawn or forced along on said floor. A scraper of this construction may be provided on each side of the agitator, or a single one may be provided, as shown in Fig. 8, and adapted to be raised on its journals and deposited and used on the opposite side of said agitator. When not in use, this scraper may be swung upward and fastened by a chain 16, or may be entirely removed from the drying-chamber. The arms of the scraper are extended to form handles, whereby the operator is enabled to guide the device to properly remove the grain from the floor of the malting-chamber.

Having described my invention, I claim—

1. In combination with an agitator-shaft and mechanism, as set forth, for driving the same, a series of reversible buckets journaled concentric with said shaft and geared together, as described, said buckets being provided with rigid reversing-ribs, substantially as and for the purpose specified.

2. A reciprocating agitator for malting-machines, provided with a central shaft and mechanism, substantially as described, for rotating the same, and having a series of reversible approximately semi-cylindrical buckets journaled concentric with said shaft and adapted, when in either position, to bear at one edge against the shaft, said buckets being provided with rigid longitudinal ribs to engage in the grain to reverse the buckets, substantially as specified.

3. In a malting-machine, the combination, with parallel ways, of journal-frames F, having at each end laterally-projecting slotted plates d' e', parallel shafts P M, journaled in said frames, geared together, and bearing, respectively, a scored pulley and an agitating device consisting of a series of reversible buckets journaled concentric with said latter shaft, frames d^2 e^2, bearing rollers d^3 e^3, and having plates that confront and engage the plates d' e', above referred to, clamping-bolts h, passing through said confronting plates, and adjusting-screws f, tapped into the ends of frames F and abutting the roller-frames d^2 e^2, all being as and for the purpose specified.

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Witnesses:
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