

G. R. CORNWALL.
 PLATE GRAINING MACHINE.
 APPLICATION FILED FEB. 4, 1910.

1,199,028.

Patented Sept. 19, 1916.

3 SHEETS—SHEET 1.

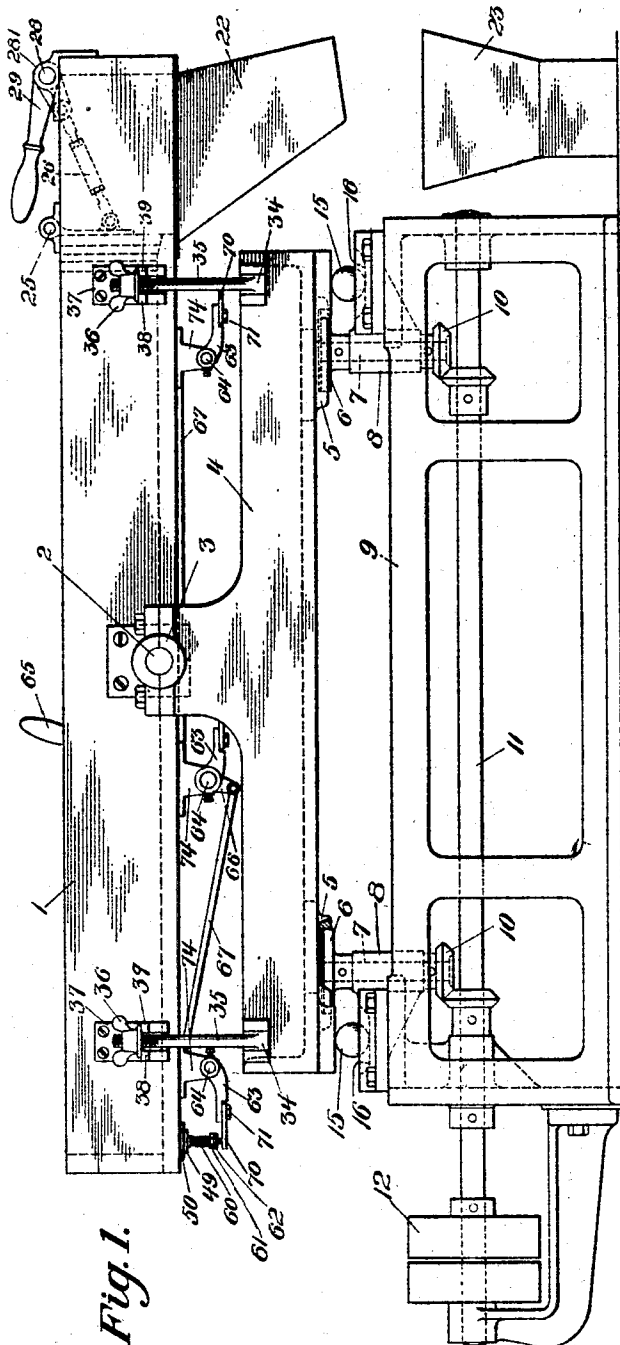


Fig. 1.

Witnesses:
 John A. Carby
 Rose Munk

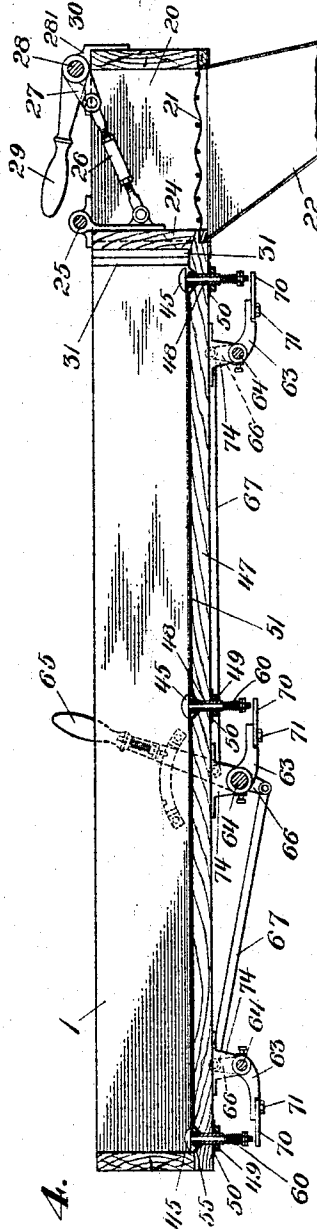


Fig. 4.

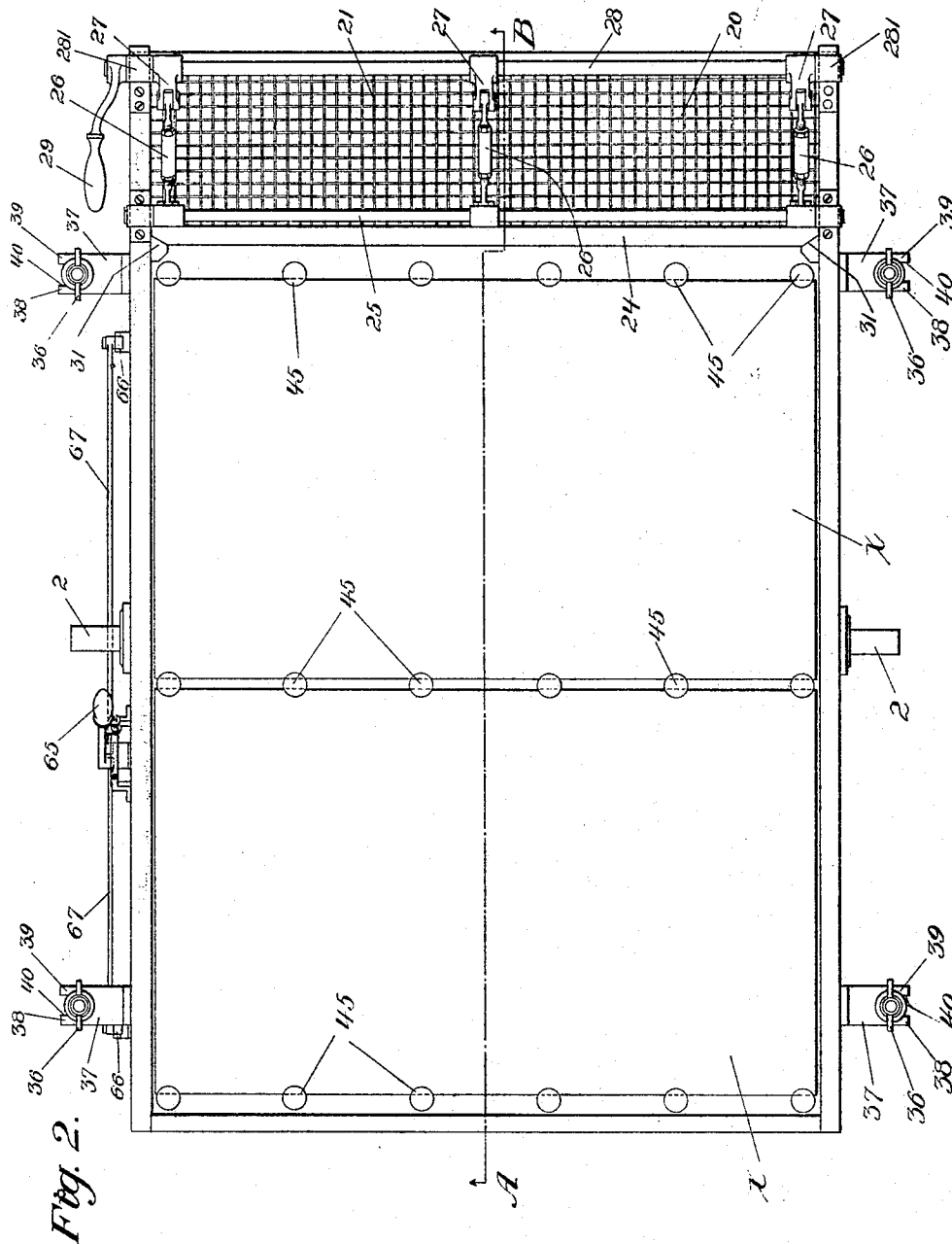
G. R. Cornwall Inventor
 By his Attorney John D. Morgan

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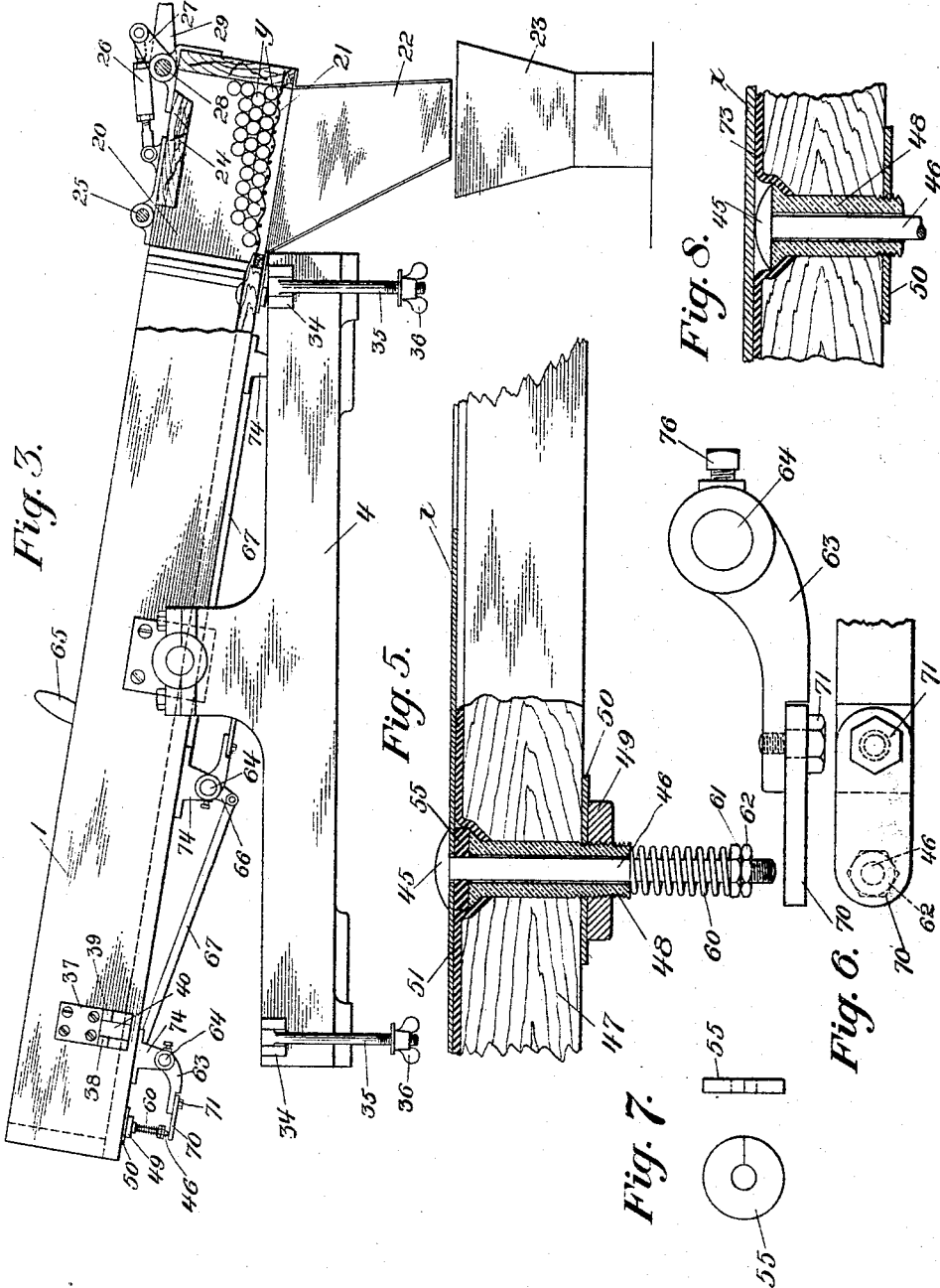
Witnesses:
 John Darby
 Rose Menck

G. R. Cornwall Inventor
 By his Attorney John D. Morgan

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3 SHEETS—SHEET 3.



Witnesses:
 John Darby
 Ross Mente

G. R. Cornwall Inventor
 By his Attorney John D. Morgan

UNITED STATES PATENT OFFICE.

GEORGE R. CORNWALL, OF RYE, NEW YORK.

PLATE-GRAINING MACHINE.

1,199,028.

Specification of Letters Patent.

Patented Sept. 19, 1916.

Application filed February 4, 1910. Serial No. 542,103.

To all whom it may concern:

Be it known that I, GEORGE R. CORNWALL, a citizen of the United States, and a resident of Rye, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Plate-Graining Machines, of which the following is a specification.

This invention relates to devices for making planographic printing plates, and more particularly to devices for graining the plates preparatory to receiving a design.

Objects of the invention are to provide a grainer in which the plates and the graining materials may be handled readily, easily and expeditiously; to provide for thorough cleaning of the box and the graining materials from slime whereby a uniform and exact graining of the plates may be secured; to provide for rapid clearing out of the graining materials to permit free removal of the plate, and to provide for rapid and easy replacement of the graining materials after a new plate is inserted; to provide a tilting box which is also firmly held during the graining movement; and to provide novel devices for holding the plates in the box and control for such devices, as well as a new lining for the box. These and other objects of invention will in part be obvious and will in part appear herein.

The invention consists in the novel parts, arrangements, constructions, combinations and improvements herein shown and described.

The accompanying drawings referred to herein and forming a part hereof, illustrate one embodiment of the invention, the same serving in connection with the description herein to explain the principles of the invention.

Of the drawings: Figure 1 is an elevation of a graining machine embodying the principles of the invention; Fig. 2 is a plan view corresponding to Fig. 1; Fig. 3 is a fragmentary view corresponding to Fig. 2 showing the plate box inclined, and the end compartment broken away to show the balls collected therein; Fig. 4 is a central longitudinal section substantially on the line A—B of Fig. 2; Fig. 5 is a fragmentary detail view

on an enlarged scale showing the devices for securing the plates in the bed of the grainer; Fig. 6 is a detail of certain parts including the plate fastening devices. Fig. 7 is a detail of the washer shown in Fig. 5; and Fig. 8 is a fragmentary view showing the plate holding device in inoperative position, retracted beneath the plate, which is shown lying thereover.

Referring to the accompanying drawings, illustrating by way of example one embodiment of the invention a box 1 receives the plate or plates and supports them during the graining operation, each plate lying in the bottom of the box to which it is fastened, the graining materials then being placed upon the surface of the plate.

In accordance with one feature of the invention the box 1 is mounted to tilt relatively to its support and in the present embodiment pintles 2 are shown fixed to the side of the box 1 and carried in journals 3 of a support 4. It will thus be understood that the box may be inclined in either of two directions opposite each other.

Suitable means are provided for moving or shaking the box in order to produce relative movement between the plate x lying in the bottom of the box and the graining materials lying on the surface of the plate x to cause said materials to grain the surface of the plate. The box 1 is given a rotatory or gyratory movement by suitable means. For this purpose seats 5 are provided in the frame 4 for eccentric disks 6 (see Fig. 1), located near each end, and substantially centrally of the end of the box 1. Each eccentric 6 is carried by a shaft 7 mounted in a sleeve 8 upon the supporting frame 9. Fixed to each shaft 7 (see Fig. 1) is bevel gear 10 meshing with a corresponding gear upon the shaft 11 shown mounted horizontally in the frame 9. The shaft 11 may be driven from any suitable source of power, and by suitable means, such as belt pulleys 12.

The frame 4 is carried upon the support 9 so as to have the gyratory or rotatory motion already described, and for this purpose there are shown balls 15 set in dished supports 16 carried at each of the four corners

of the frame 9, and upon which rest plates 17 fastened to the corners of the box 1.

The invention in one of its features provides means for receiving the graining materials at one side of the plate holding areas while the plates are being changed and also for cleansing the graining materials. In the present embodiment there is shown as a part of, or affixed to, the box 1 a compartment 20, which compartment is shown with a perforate bottom, which may be a grating 21. Beneath said grating is shown a suitable funnel or spout 22, which at its top takes in the entire area of the grating 21 and is then sloped or narrowed inwardly from the sides and also lengthwise of the box. If desired this spout 22 may be located conveniently to a suitable conduit or trap 23.

Means are provided for opening or closing communication between the plate graining box or portion and said compartment for the graining materials. A gate 24 (Figs. 1, 2, 3 and 4) is pivotally hung at points 25 and when closed this gate serves as an end of the plate graining compartment. The gate 24 is swung on its pivotal mounting by suitable operating means. Links 26 are shown pivoted to the gate 24 and to arms 27, respectively, on the shaft 28, mounted upon the sides of the compartment 20 in bearings 281. A hand lever 29 serves to rotate the shaft 28 and through the connections described to open and close the gate 24 and to hold it in either the open or closed position. In the open position the arms 27 are thrown back sufficiently far that they will not pull over the center (Fig. 3) and in the closed position the arms 27 and rods 26 are in a practically straight line, thus locking the door in that position. A turn buckle 30 or other suitable adjusting device may be provided if desired in each link 26 or elsewhere in the train of connections, in order to make a tight fitting connection for the gate 24. Said gate is shown fitting against beveled portions 31 on the bottom and side of the box 1 to make a water tight joint.

Means are provided for holding the graining box 1 firmly in position on its support 4 during the gyration or shaking operation. Bolts 35 are shown at each corner of the frame 4 pivoted to said frame at 34. Carried upon the sides of the box 1 are brackets 37 having the projections 38 and 39 extending on each side of the slot 40. The nut 36 is threaded on the rod 35 and after the rods are swung into the slots 40, these nuts clamp down firmly on the projections 38 and 39. The box 1 is thus firmly held relatively to its frame 4 at three points along each side and so all tendency to strain or rack the box or the pintles 2 is avoided during the gyration of the box and frame 4 under the drive

of the eccentrics 6. The parts are shown clamped in Fig. 1 and unclamped to permit the tilting of the box 1 in Fig. 3.

Plate holding means are provided wherein a plurality of fastening devices may act separately and unitedly upon the plate to hold it against the bottom of the box. Said plate holding devices are also shown mounted in the box 1 and operable from the exterior of the box. A plurality of engaging heads 45 which take over an edge of the plate *x* to hold it against the bottom of the box (see Fig. 5). Each head 45 is shown fixed on a rod 46 passing through the bottom 47 of the box 1. The rods 46 work in sleeves 48, respectively, fixed in the bottom 47 of said box 1. The sleeves 48 are shown with their top portions beveled, and the sleeve being countersunk in the bed 1. The bottom end of each sleeve 48 is threaded and takes a nut 49 and a washer 50, whereby the sleeve is firmly held in position in the bed. The lining 51 of the bed is shown carried down around the beveled or conical part of the sleeve 48 being thereby firmly held in position, and making a water-tight joint. Above the sleeve 48 and surrounding the rod 46 is a split washer 55, which may be of rubber or other resilient material if desired. This washer lies underneath and supports the edge of the plate where it is clamped by the head 45. When the particular head 45 is not in use, as when it lies underneath instead of at the edge of a plate which is being grained, the washer may be removed and the head 45 drawn down beneath the level of the bottom of the box 1, the plate *x* then extending thereover, as shown in Fig. 8.

Means for controlling the plate fastening devices and causing them to clamp and unclamp the plate on the bottom of the box are provided. Springs 60 are coiled upon the rods 46, respectively, each spring bearing against the bottom end of the sleeve 48 and also against the nut 61, which, together with lock nut 62, is threaded upon the lower end of the rod 46. The springs 60 pull the fastening devices 45 downward toward or against the bottom of the box 1. Means are provided for moving said devices upwardly against their springs, either collectively or by selecting only certain ones. As in case a head 45 is beneath a plate, obviously it would not be desirable to move that head upwardly with those which engage the edges of the plate, and are moved to unclamp and permit removal of the plate. Arms 63 are fixed upon a shaft 64 by suitable means such as a set screw 76 (Figs. 1, 3, 4 and 6), there being one arm 63 for each of the rods 46, on which rods the heads 45 are carried. The end of each arm 63 is just beneath and just clear of the end of the rod 46. The shafts 64 are carried in bearings 74 fixed to the bottom of the box 1. A hand lever 65 is

shown fixed to one of the shafts 64 and the various shafts 64 are provided with arms 66, connected by links 67 to each other or to the lever 65, whereby they may all be simultaneously operated from the hand lever.

To leave one or more of the plate fastening devices 45 at rest when the remainder are actuated, as heretofore referred to, the arms 63 are shown having each a part 70 pivotally attached to the remainder thereof by a set screw or binding screw 71. Thus the end of the arm 63 may be swung either into alinement with its rod 46 or it may be swung to one side so as to be out of alinement and of operative relation therewith. In the first case, as when the parts are in the position shown in Figs. 6 and 7, when the arm 63 is moved it lifts the rod 46 and in the other case, as when the part 70 is swung sidewise around the nut 71 from the position shown in Fig. 7, it does not lift the rod 46 and leaves the head 45 undisturbed.

So far as concerns many features of the invention, the lining 51 for the box 1 may be of any suitable material, but in accordance with one feature of the invention the lining of a yielding or resilient material such as rubber, which under certain circumstances will be found to give superior results.

The manner of operation of the described and illustrated mechanism is substantially as follows: The box 1 may be considered to be empty. The hand lever 65 may be thrown to rock the shafts 64 and, through the arms 63 acting on rods 46, raise the fastening devices 45, whereupon the plate or plates x may be placed in the bottom of the box. The lever 65 may then be thrown in the other direction, whereupon the fastening devices 45 descend, the springs 60 bringing them firmly into engagement with the plates to hold them in position. Should any of the fastening devices 45 be beneath the surface of a plate, its washer 55 will have been previously removed so that the fastening device is pulled down to the position shown in Fig. 8 below the plane of the plate in the bottom of the box 1. The end 70 of the corresponding arm 63 will have been moved to one side so that the actuation of the shaft 64 will not raise or lower this particular fastening device.

It is common in the art to use balls, or marbles, of porcelain, glass or other suitable material, together with powdered pumice, silix, or other suitable materials for the graining, and a sufficient quantity of water.

The balls y may be regarded as lying in the compartment 20, having been washed off, the water having drained away through the grating 21. While the plates are being put in, the box may be either level or tilted. For convenience in description we may consider that it was level and that it was held

by the pivoted clamps 35. These clamps may now be loosened and will swing downwardly out of engagement with the clamping brackets 37. The box may then be tilted in the opposite direction to that shown in Fig. 3 and the balls y may be quickly and expeditiously removed from the compartment 20 into the graining box 1, and they will there lie upon the positioned plate or plates x . The box may then be brought back to a level position and firmly fastened to the frame 4 by the clamps 35. A suitable quantity of the silix or other powdered or grained material may now be added with the requisite amount of water and the machine set in operation, the box 1 and its contents being rotated or gyrated by the eccentrics 6 driven from the shaft 11. The inertia of the balls y and the wet silix will cause them to move on the face of the plate and thereby "grain" or put it into condition to receive a design. After the graining of the plates is completed the power is thrown off and the box 1 brought to rest. The clamps 35 being removed, the box 1 may be tilted into the position shown in Fig. 3. The hose may now be used to wash the balls y , and the accumulated slime down into the compartment 20, the box 1 being thoroughly hosed out leaving the plate or plates x , now completely grained, absolutely clean in the bottom of the box. The balls y may be also washed clean in the compartment 20, the water and slime running off through the funnel 22. The plates x may now be removed, and replaced by other plates to be grained.

It will be seen that not only does the graining machine embodying the principles of this invention give great convenience, facility and expedition in handling of the plates; and also obviates the pulling of the plates from beneath the balls and through the slime, as well as obviating repeated handlings of the balls, and the scooping and sponging out of the slime as is usually done, but it also preserves standard conditions within the box so that the graining action is rendered more uniform throughout all parts of the plate as well as on successive plates or groups of plates which follow each other in succession in the box. This is effected by the elimination of slime or detritus, and by assuring a uniform cleanliness of the graining materials. Other advantages and objects realized through the present invention will be obvious to those skilled in the art.

The invention in its broader aspects is not limited to the particular forms of construction herein shown, nor to any particular forms of constructions, but changes may be wrought herein without departing from the principles of the invention and without sacrificing its chief advantages.

What I do claim and desire to secure by Letters Patent is:

1. A graining machine including in combination a support, a plate box mounted on said support, means for gyrating said plate box, and means for tilting the plate box relatively to its support.
2. A graining machine including in combination a support, a plate containing box mounted substantially horizontally on said support, means for gyrating said plate containing box, and means for tilting said plate containing member relatively to its support in opposite directions from the horizontal.
3. A graining machine including in combination a box for holding the plates and the graining materials, a receptacle for the graining materials adjacent to the plate containing box, and means for controlling the passage of the graining materials between said receptacle and box.
4. A plate graining machine provided with a receptacle for the graining materials, said receptacle being provided with means for permitting the water to flow there-through whereby the graining materials are washed but retained in the receptacle.
5. A graining machine including in combination a box for containing the plate and graining materials, a receptacle for the graining materials communicating with said plate box, and means for tilting the box to facilitate the removal of the graining materials to and fro between said box and said receptacle.
6. A graining machine including in combination a plate holding box, gyrating means for said box, a compartment adjoining the box having a perforate bottom and a gate for opening and closing the passage between said box and said compartment.
7. A graining machine including in combination a plate holding box, gyrating means for said box, a compartment adjoining the box having a perforate bottom, a gate for opening and closing the passage between said box and said compartment, and means for holding said gate in the open or closed position.
8. A graining machine including in combination a frame, a support mounted to gyrate on said frame, a plate holding box mounted to tilt on said support, and means for firmly clamping said box and support to each other whereby they will move together during such gyration.
9. A graining machine including in combination a plate holding box, a compartment at one end thereof, a gate between said compartment and box, means for tilting said box and compartment together whereby the compartment may be above or below the box and means for gyrating the box.
10. A graining machine including in combination a plate holding box, a compartment at one end thereof, having a perforate bottom, a gate between said compartment and box, means for tilting said box and compartment together whereby the compartment may be above or below the box, and means for gyrating the box.
11. A graining machine including in combination a plate holding box having one end removable, and means for pressing said end against the contiguous parts of the box.
12. A graining machine including in combination a plate holding box having a removable end, and means for tilting the box in the direction of said end.
13. A graining machine including in combination a plate holding box, a support on which said box is pivotally mounted centrally of the box, and clamps at either side of said pivotal mounting for clamping the box and support together, and means for gyrating the box and support.
14. A graining machine including in combination a box for holding the plate to be grained and the graining materials acting on the plate, and an elastic lining upon the interior of said box extending from the bottom thereof up on to the sides.
15. A graining machine including in combination a plate holding box and means carried by the floor of the box for engaging and holding the plate therein.
16. A graining machine including in combination a plate holding box, a plate engaging device held yieldingly against the bottom of the box, the plate being held between said device and the bottom of the box.
17. A graining machine including in combination a plate holding box, a plate engaging device held yieldingly against the bottom of the box, the plate being held between said device and the bottom of the box, and means for pressing said engaging device away from the bottom of the box to release the plate.
18. A graining machine including in combination a plate holding box, a plate engaging device held yieldingly against the bottom of the box, the plate being held between said device and the bottom of the box, and means exterior to said box for pressing said engaging device away from the box bottom to release the plate.
19. A graining machine including in combination a plate holding box, a plurality of devices for holding the plate in position within the box, and a device for simultaneously causing a plurality of said holding devices to engage or disengage the plate.
20. A graining machine including in combination a plate holding box, a plate engaging member mounted in the bottom of said box and means for withdrawing said engaging member below the level of the box bottom so that a plate may lie thereover.
21. A graining machine including in com-

ination a support, a plate containing box journaled intermediate its ends upon said support, means for gyrating said plate containing box, and means for tilting said box
5 about its bearing upon said support in either direction from the horizontal.

name to this specification, in the presence of two subscribing witnesses.

GEORGE R. CORNWALL.

Witnesses:

JOHN D. MORGAN,

ROSE MENK.

In testimony whereof, I have signed my

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