May 29, 1934. S. METRICK 1,960,447

GRAINING MACHINE

Filed June 16, 1931 3 Sheets-Sheet 1

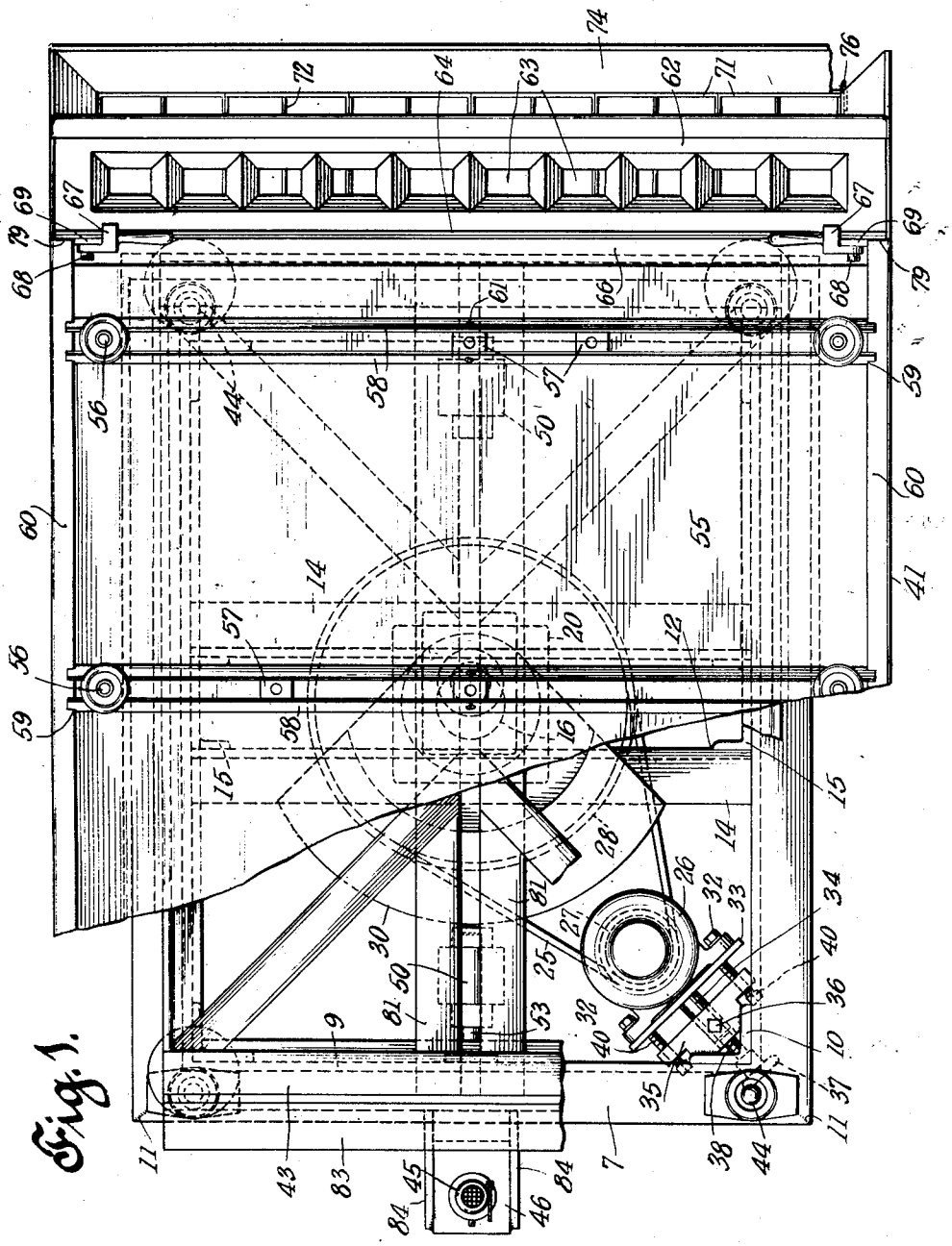


Fig. 1.

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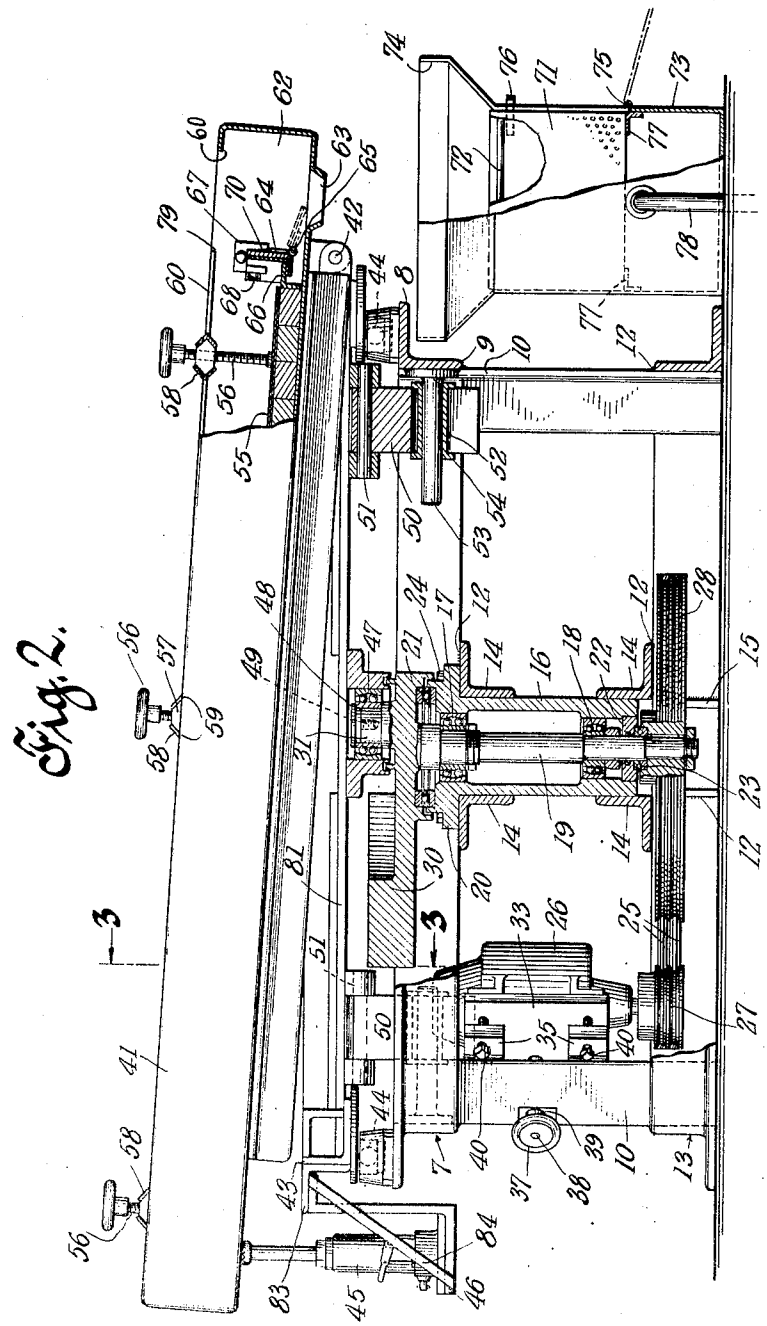


Fig. 2.

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Fig. 4.

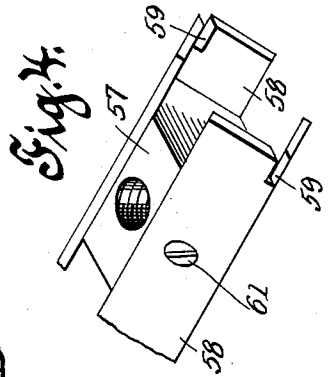


Fig. 3.

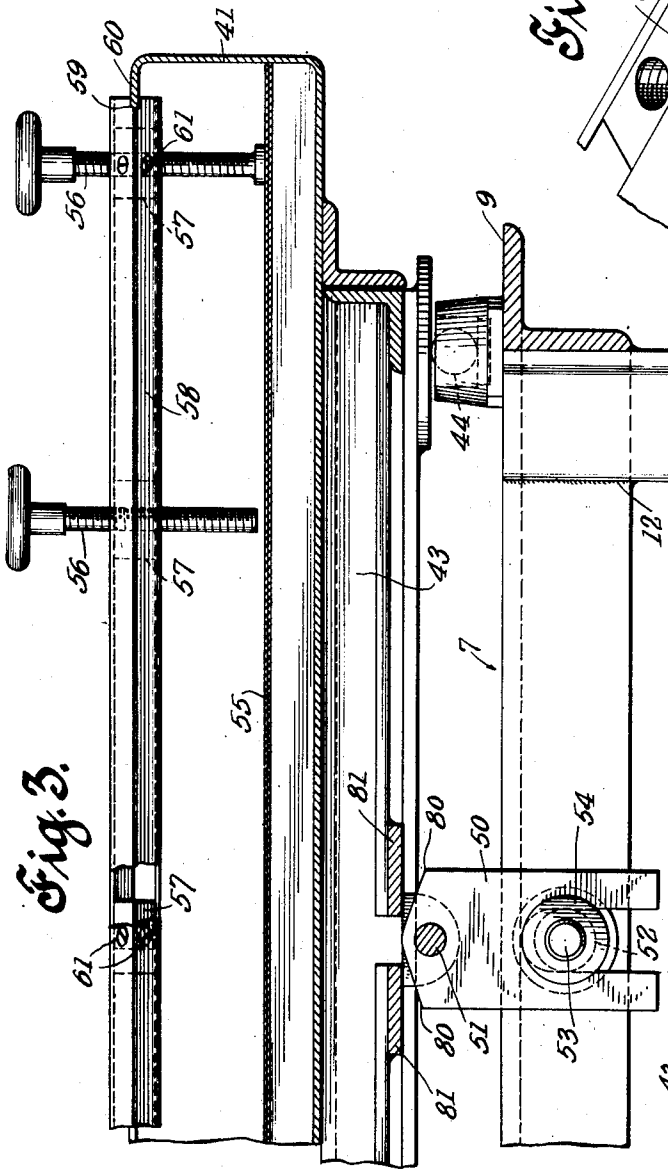
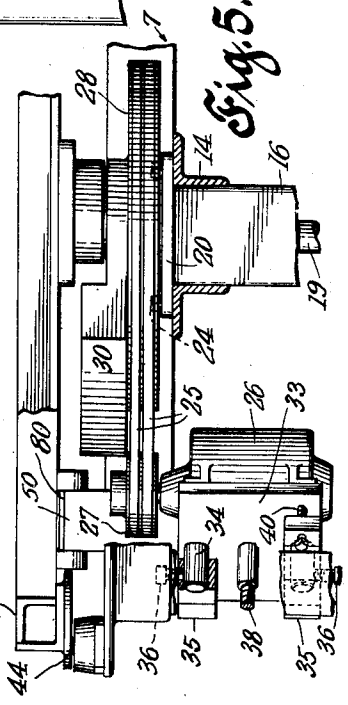


Fig. 5.



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UNITED STATES PATENT OFFICE

1,960,447

GRAINING MACHINE

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Application June 16, 1931, Serial No. 544,753

8 Claims. (Cl. 51—6)

This invention relates to the art of graining printing plates.

The objects of the invention are to improve and simplify apparatus for the purpose; to provide a quiet, smooth running machine, which can be operated at high speed; to facilitate the emptying of the tub and the washing of the grained plates; to enable easy handling of the graining marbles and the cleaning of the same; to automatically collect and hold the "mud" or waste resulting from the graining operation and in other ways to provide a machine practical and desirable for the purpose.

The drawings accompanying and forming part of the specification illustrate certain practical embodiments of the invention, it being understood however, that the structure may be modified from the present disclosure, without departure from the true spirit and broad scope of the invention.

Fig. 1 is a plan view of the machine with the tub shown broken away at one end to expose the vertical motor and belt drive; Fig. 2 is a side elevation with parts broken away and appearing in section to show particularly the belt drive from the motor to the vertical eccentric shaft; Fig. 3 is an enlarged vertical sectional view as on substantially the plane of line 3—3 of Fig. 2, showing in end elevation one of the rocking and sliding frame guides; Fig. 4 is a broken perspective view showing one of the fixed clamp supporting blocks; Fig. 5 is a broken and part sectional side elevation illustrating a top-drive form of connection from the motor to the eccentric shaft.

The base of the machine consists in the illustration of a frame made up substantially entirely of angle pieces united by welding into a single unitary structure. In the particular form shown, there is a top rectangular frame 7 made up of angle pieces welded at the corners at 8, and arranged with the flanges vertically and horizontally, the horizontal flanges 9 disposed at the top and extending outwardly from the vertical flanges 10, so as to leave the interior of the corners clear to receive the angular upright angle pieces 11, which are welded in these corners, as indicated at 12. At the bottom, there is a corresponding or duplicate rectangular frame 13, made up similarly to the upper frame but arranged with the horizontal flanges downwardly to rest on the floor or other base structure. These upper and lower rectangular frames may be made up in duplicate and be used interchangeably for upper or lower frames, or these frames may be connected by the angle corner pieces to form the machine frames and then be faced up one way or the other, depending upon which side is found most suitable for the top or bottom of the completed machine frame.

The bracing of the frame may be effected by using other structural shapes, such as illustrated particularly in Figs. 1 and 2, where L-section or angle pieces 14 are shown as welded in spaced relation to the inside edges of the upper and lower rectangular frames and to the vertical channels 15, which are welded to the inner vertical faces of the upper and lower frames.

In addition to bracing the intermediate portion of the complete frame, the spaced cross-bars 14 provide mounting seats for the vertical boxing 16, which carries the upper and lower bearings 17, 18, for the tub actuating shaft 19.

The boxing 16 may be of rectangular outline as indicated particularly in Figs. 1 and 2, so as to fit closely between the cross-bars 14 to which it may be welded and the upper end of this box is shown as flanged outwardly into a head 20 seating on the horizontal flanges of the upper cross-bars and secured if desired by welds 12, Fig. 2.

The machine frame constructed as illustrated of structural steel parts united by welds is stronger but much lighter than a cast metal frame, it is cheaper to build and can be readily constructed in various sizes and shapes to suit special requirements. Also, practically all the work can be done in a single shop, since the services of a foundry are not required in the make-up of the frame, with the exception possibly of the boxing for the shaft, which is a comparatively simple form of casting.

In addition to forming a support for the shaft bearings, the boxing 16 provides a complete housing for these bearings, protecting same from dirt and from the washing water used on the machine. The upper head portion of the boxing provides a wide support for the large thrust bearing 21 and the opposite end portions of the boxing are machined as indicated, to form proper seats for the upper and lower radial bearings 17, 18, the bottom closure 22, and the lower thrust bearing 23. If desired, the shaft boxing may be bolted down in place, instead of, or in addition to being secured by welding. Thus, as indicated at 24, bolts may be employed for removably fastening the flange or head portion of the boxing down on the horizontal flanges of the upper cross-bars 14, so that this entire boxing and bearing as-

sembly may be readily set in or removed from the machine frame.

The drive of the tub actuating shaft is effected in the present invention without gears, by employing a belt drive 25 from an electric motor 26, mounted with its shaft vertical, in parallelism with the tub shaft. This motor is shown as mounted adjustably in one corner of the frame and as carrying a belt pulley 27 at one end for the belts 25, encircling the larger pulley 28 on the shaft 19.

The belt drive described, may be located either at the bottom as in Fig. 2, or at the upper end of the tub shaft as in Fig. 5, or if desired, belt drives may be run from both ends of the motor shaft to both ends of the tub shaft. Usually, however, the drive from one end only is sufficient, as illustrated. Where the drive is located at the top as in Fig. 5, the pulley on the tub shaft which is here designated 29, may be formed complemental to or as a unitary part of the counterweight 30, which is provided on the upper end of the shaft offset from the crank pin 31.

The motor is shown in Fig. 1 as detachably bolted at 32, on a base plate 33, having studs 34 on the back of the same sliding in bearings in the supporting blocks 35 secured in the corners of the frame. Set screws are indicated at 36 for securing these motor base studs in various positions of adjustment and for positively effecting an outward belt tightening adjustment of the motor, a hand wheel is shown at 37 engaged on a screw threaded stud 38 projecting from the back of the motor base and having a thrust engagement with a stationary part of the frame at 39 to exert an outward pull on the motor base.

In addition to the set screws 36, securing means for the motor base are indicated in the form of set screws 40 threaded through the mounting blocks 35 and engaging the back of the motor base 33. Upon loosening the upper and lower set screws 36 and 37, the motor may be freely adjusted for belt tightening or other purposes, using the hand screw 37 to positively shift the motor in a belt tightening direction and when the desired adjustment is effected, the motor may be quickly and positively locked up in that adjustment, by simply tightening the upper and lower set screws.

The graining tub which is indicated generally at 41, is shown as hingedly mounted at one end at 42 on a so-called sub-frame 43, which rides on ball supports 44 at the corners of the main frame, the tub being tilted when required by means of a hydraulic jack 45 mounted on a step 46 on the end of the sub-frame opposite the hinge end. The sub-frame is directly actuated by the crank or eccentric through the medium of a self-aligning bearing 47, shown as positively secured over the end of the crank pin by a flanged cap 48, fastened to the end of the crank pin over the bearing by a screw stud 49.

The tub frame is guided for the proper graining movements on the main frame by special means in the present disclosure comprising forked yokes 50 hung from opposite ends of the sub-frame on pivots 51 and slidingly engaging over the sleeves 52, which ride over the pins 53, projecting inward from the ends of the stationary frame and flanged at the ends at 54 to confine the forks of the yokes thereover. The longitudinal movement of these so-called spool sleeves over the studs 53, takes care of tub motion in one direction, whereas the swinging of the yokes on the pivot pins 51, takes care of motion at right angles to the first line of motion and the combination of the two allows for the in-between variations of movement. It is to be observed, that the sliding sleeves are quite long, that the yokes extend the full length of these sleeves and that the yoke pintles are equally long, which construction holds the tub under control, overcoming rotational tendencies of the tub without binding of the bearings.

The plates to be grained are indicated at 55, held down on the wooden floor of the tub by clamp screws 56, threaded in double V-shaped blocks 57 engaged between the spaced reversely angled bars 58, slotted at the ends at 59, to engage over the inturned flanges 60 at the upper edges of the tub. The screw seat blocks 57 are also utilized in the illustration as spacers and ties for the V-bars 58 by means of the screws 61, Figs. 3 and 4, extended through the V-bars into the sides of the blocks. If desired, intermediate nut blocks 57 may be slidingly engaged between the fixed blocks as indicated particularly in Figs. 1 and 3, to locate the clamp screws at any desired positions across the tub and the sliding engagement of the bars with the flanges of the tub, permit lengthwise adjustment of the clamps. The loosening of the clamp screws also loosens the clamp supporting bars and conversely the tightening of the screws sets up the clamps and also secures the clamp bars in the positions to which they may be shifted.

At the hinge end of the tub, that which becomes the lower end when the tub is tilted, there is provided a discharge trough extension 62, having funnel shaped discharge openings 63, across the width of the tub. This discharge trough portion may be separated from the main body of the tub by a dam 64, pivoted at 65 and rubber-faced to make close fitting engagement with the horizontal flange of an angle iron element 66, extending across the bottom of the tub at the end of the wood flooring. This dam is shown as releasably secured in place by the hook shaped yoke 67, pivoted at 68, on supporting lugs 69, extended inward from the opposite sides of the tub. These yokes may be beveled somewhat in their jaw portions, as shown at 70 in Fig. 2, so as to readily take over and squeeze the dam firmly into position. When these securing hooks are thrown upward, the dam may be dropped down as indicated in broken lines in Fig. 2, to permit the graining marbles to roll smoothly thereover into the discharge funnels.

In the present illustration, special holding means are provided for catching the marbles released from the discharge trough, said means consisting of perforated baskets 71, having cross handles 72, by which they may be individually lifted out of the floor trough 73. This floor trough is shown suitably mounted on the floor or other base beneath the end of the tub, it being conveniently formed with a hopper mouth 74, draining into the baskets. The outward side of the floor trough is indicated as hinged at 75, so that it may swing downwardly as indicated in Fig. 2, to permit the baskets being readily withdrawn from beneath the over-hanging portion of the tub. Suitable spring catches, such as indicated at 76, may be provided on the end walls of the trough for holding this hinged portion normally in the upper closed relation.

As shown particularly in Fig. 2, the marble baskets rest on angle iron flanges 77 in the stationary trough, with the bottoms of the baskets

above the bottom of the trough, so as to permit the waste to drain off the marbles into the trough and a drain is shown at 78 extending from a level above the bottom of the trough, so as to cause the waste to settle in the bottom of the trough. The waste which is thus collected may be removed from time to time from the bottom of the trough, free access for this purpose being provided by dropping down the front of the trough and removing the baskets.

The side flanges 60 of the top are shown as interrupted or discontinued adjacent the trough end of the tub as at 79 in Figs. 1 and 2, to enable the clamp bars being removed when desired, upon sliding them down past the ends of these flanges.

To provide certain limits of movements, the swinging yokes 50 may be constructed as shown in Fig. 3, that is with inclined faces 80 at the upper ends of the same designed for engagement with the underfaces of the cross bars 81, which carry the hinge pins for these yokes.

The constructions illustrated are especially quiet and smooth running for a machine of this size and weight, due particularly to the simplified direct form of belt drive from the motor to the tub actuating shaft, the supporting of the motor directly on the main frame and the welded unitary structure of the frame, free of all bolts or other fastenings.

While the structures shown have proved entirely practical in operation, it will be realized that many changes may be made to meet different requirements within the broad scope of the patent protection, so it will be appreciated that the terms employed herein have been used in a descriptive rather than in a limiting sense, except possibly for limitations, such as may be imposed by the state of the prior art.

The step 46 on which the tub tilting jack is mounted, is shown in Figs. 1 and 2, in the form of a hanger having an inwardly directed portion at its upper end welded under the horizontally extended flange of the end angle bar 83 of the tub frame and having an outwardly extending shelf portion at its lower end providing the step proper. As the strain on this shelf may be considerable, the same is shown as reinforced by inclined struts 84 welded to the edges of the hanger and extending from the outer portion of the shelf inwardly and upwardly to the root of the hanger, where it is welded to the frame. This gives the hanger the necessary rigidity and strength, without materially adding to the weight and bulk of the same.

In Fig. 2, it will be noted that when the dam 64 is dropped down, it serves as an inclined guide directing the marbles over into the discharge slots 63 in the bottom of the trough portion of the tub. The solid end wall of this trough portion, together with the overstanding flange 60 at the upper end of such wall, operate to retain the marbles loosed by the dam, holding them against bouncing out of the tub and causing them to drop down through the outlet openings in the bottom of the tub into the stationary collecting trough supported on the floor.

What is claimed is:

1. In combination, a supporting frame, a movable frame mounted on the supporting frame, forked yokes suspended from the movable frame, sleeves engaged by said forked yokes and guides on the supporting frame on which said sleeves are slidingly engaged.

2. In combination with a supporting frame and a movable frame, guides on one of said frames, flanged end sleeves slidingly engaged on said guides and yokes pivoted to the other frame and engaged over the sleeves between the end flanges of the same.

3. A graining tub having discontinuous inwardly extended flanges on the sides of the same, clamp bars slidably engaged with said flanges and removable therefrom at the discontinued portions of the same and plate clamping means carried by said removable bars.

4. In a graining machine, the combination of a graining tub having a marble outlet, a stationary trough positioned beneath said outlet and having a section of the front wall of the same above the bottom of the trough movable to enable access to substantially the full length of the trough, supporting shoulders in the trough independent of said movable wall section and marble baskets removably supported on said shoulders above the bottom of the trough in position to throw the graining waste into the bottom of the trough and freely removable laterally from the trough as individual units upon the opening of the front wall section of the trough.

5. In combination with a graining tub having inwardly extending flanges, plate clamping bars composed of angle bars secured together in spaced opposed relation and slotted at their ends to slide over the tub flanges, blocks engaged between the opposed hollows of the angle bars and plate holding clamp screws mounted on said blocks.

6. A plate graining machine, comprising in combination, a base frame, a tub frame mounted for graining movement on said base frame, a graining tub hingedly mounted on one end of said tub frame and extending over the opposite end of said tub frame, a hanger carried by said opposite end portion of said tub frame and extending dependently therefrom down over the outside of the base frame and free of said base frame in the graining movements of the tub frame on the base frame, said dependent hanger having an outstanding shelf portion at the lower end of the same, inclined braces extending from the upper end portion of said hanger downwardly and outwardly to the outer part of said outstanding shelf portion and providing a recess therebetween over said shelf portion and a hoisting jack seated on said shelf portion and occupying said recess between the inclined braces and thereby definitely positioned and retained on the shelf portion beneath the extended end of the graining tub.

7. A plate graining machine, comprising in combination a stationary angular base frame, a graining tub mounted for substantially horizontal graining movements on said base frame, a substantially vertically disposed shaft carried by and journalled in the central portion of said base frame beneath said tub, an eccentric member on the upper end of said shaft and connected to drive said graining tub, a motor mounted on the base frame in one corner portion of said base frame beneath the tub and having a vertical shaft disposed in a corner part of the base frame, a horizontally disposed pulley member on said motor shaft within the angle of the corner portion of the frame, a larger horizontally disposed pulley member on the eccentric shaft in horizontal alignment with said motor pulley member and horizontally extending endless drive connecting means running over said pulley members direct from the motor in one corner of the frame to the eccentric shaft in the central portion of the frame, said power and driving means being thereby located entirely within, supported on and protected by the

structure of the base frame and covered by the graining tub and with the drive from the motor to the eccentric shaft all running substantially horizontally and substantially parallel with the normal plane of movement of the graining tub.

8. A plate graining machine, comprising in combination, a stationary angular base frame, a graining tub mounted for substantially horizontal graining movements on said base frame, a substantially vertically disposed shaft carried by and journalled in the central portion of said base frame beneath said tub, an eccentric member on the upper end of said shaft and connected to drive said graining tub, a motor mounted on said base frame in one corner portion of the same beneath the tub and having a substantially vertical shaft disposed in a corner part of the base frame, a substantially horizontally disposed pulley member on said motor shaft within the angle of the corner portion of the frame, a larger substantially horizontally disposed pulley member on the lower end of the eccentric shaft in substantially horizontal alignment with said motor pulley member, substantially horizontally extending endless drive connecting means running over said pulley members direct from the motor in one corner of the frame to the lower end of the eccentric shaft in the central portion of the frame and a counterweight for said eccentric member, said counterweight being mounted on the upper end of the centrally disposed shaft.

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