

March 23, 1937.

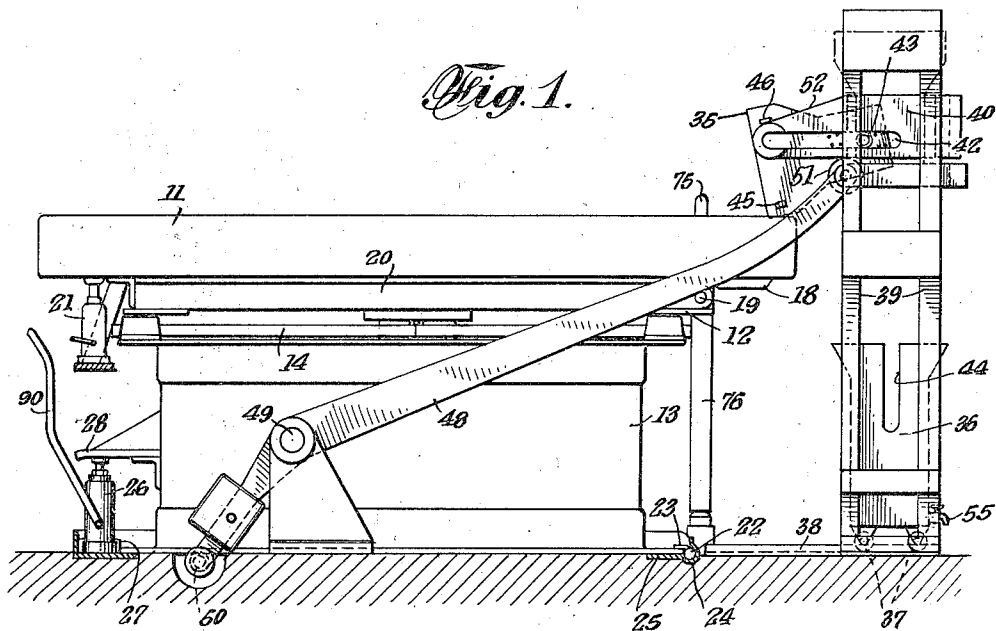
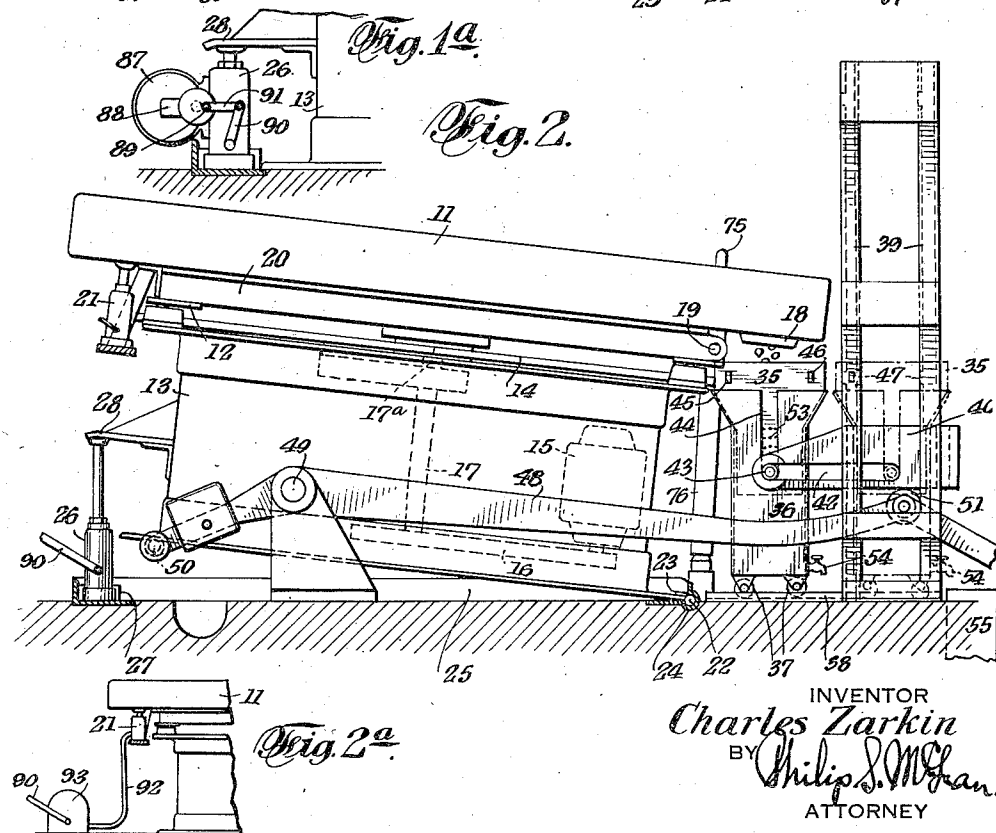
C. ZARKIN

2,074,633

GRAINING MACHINE

Filed Dec. 18, 1934

4 Sheets-Sheet 1



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March 23, 1937.

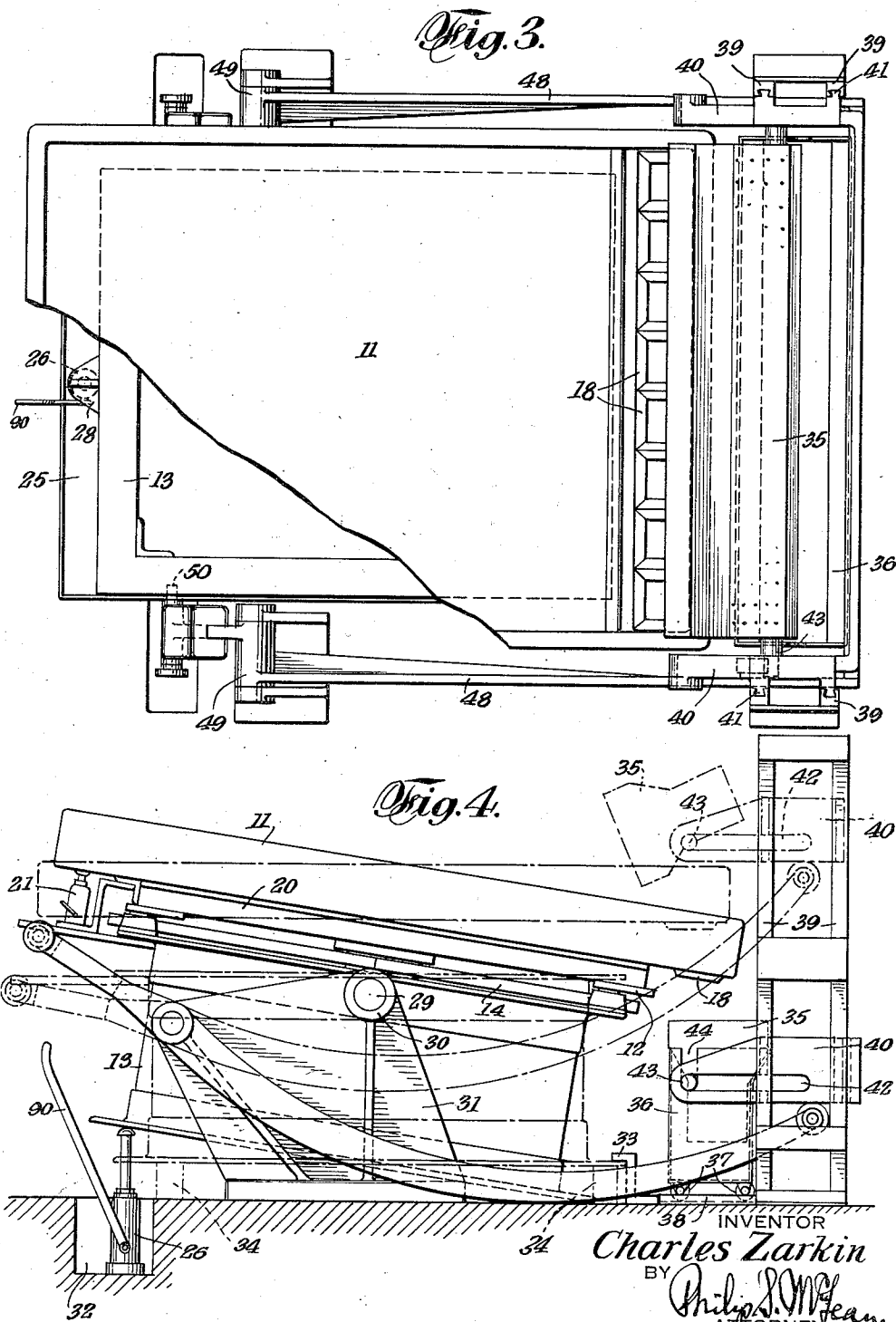
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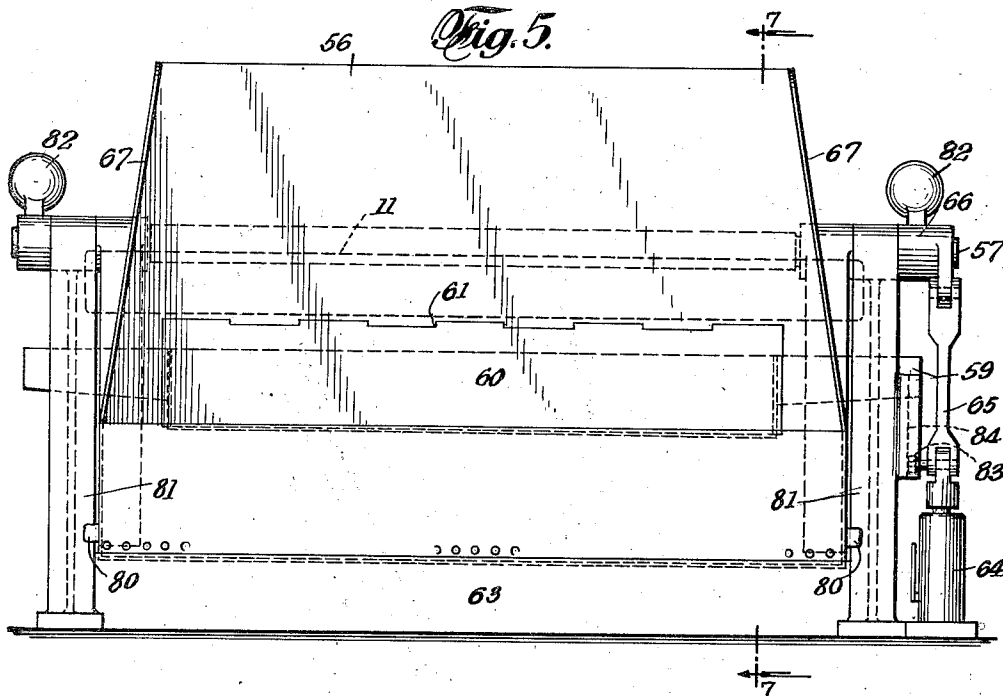
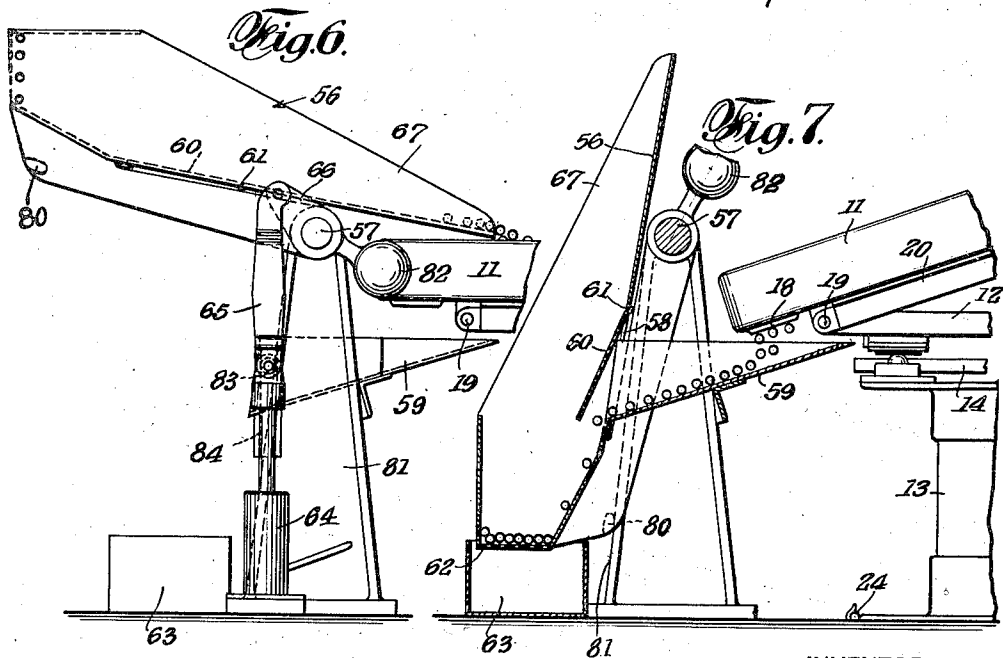
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4 Sheets-Sheet 3



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Fig. 8.

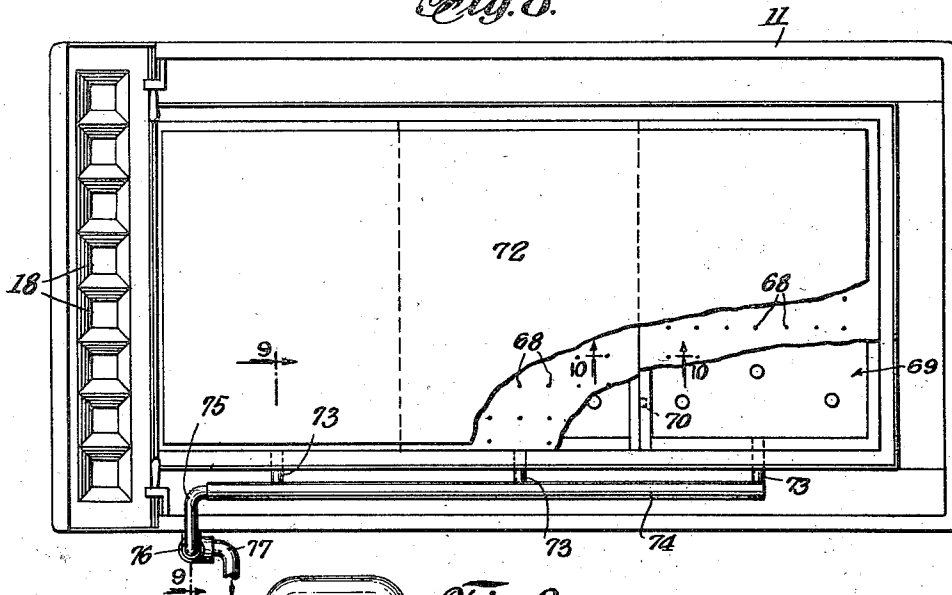


Fig. 9.

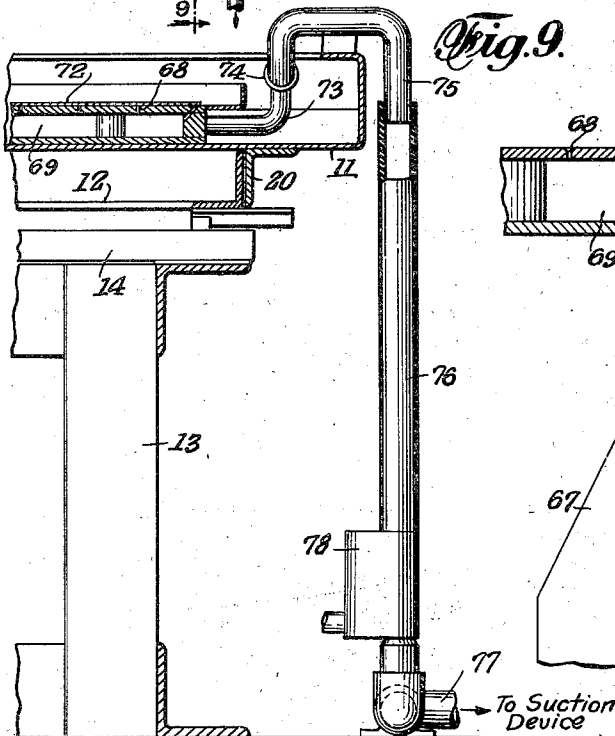


Fig. 10.

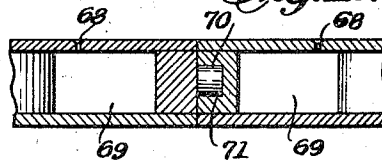
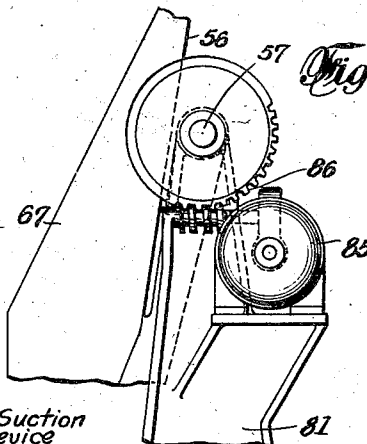


Fig. 11.



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GRAINING MACHINE

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Application December 18, 1934, Serial No. 758,025

17 Claims. (Cl. 51—6)

This invention relates to the graining of printing plates.

Graining machines have heretofore been constructed so that the graining tub may be tilted to drain off the graining marbles and to enable proper washing of the plates, etc. These tubs have been made progressively larger and with such growth in size, a serious difficulty has arisen in that such large tubs have a tendency to warp or twist when the machine is operated with the tub in a tilted position.

It is one of the objects of this invention to overcome the difficulty mentioned and to provide a practical commercial construction in which there will be no tendency of the tub to warp or twist, regardless of its size.

In the large size machines to which this invention is particularly directed, another difficulty has been the handling of the quite heavy quantities of graining marbles required in the operation of such machines.

Another object of the invention is to simplify the handling of these large quantities of graining elements and to provide simple, practical means for shifting and handling these materials as may be necessary in the plate graining operations.

Other objects and purposes of the invention and the novel features of construction, combinations and relations of parts by which the same are accomplished will all appear as the specification proceeds.

The drawings accompanying and forming part of the specification illustrate certain practical embodiments of the invention. It is to be understood however, that the structure may be modified and changed as regards the present disclosure, within the true intent and broad scope of the patent claims.

Fig. 1 is a side elevation with parts appearing in section of one embodiment of the invention showing the machine in the position for graining operations.

Fig. 1a is a broken side view of a modification. Fig. 2 is a similar view showing the machine tilted for discharging the marbles. Fig. 2a is a broken detail of the top tilting jack.

Fig. 3 is a broken plan view of the machine.

Fig. 4 is a side elevational view of another form of the machine mounted for tilting about an intermediate center, instead of on a center at one end of the machine as in Fig. 1.

Fig. 5 is an elevation of a special trough construction which can be raised and tilted to pour marbles back into the tub.

Figs. 6 and 7 are broken end views showing first the marble trough raised for pouring the marbles back into the tub and secondly the trough in lowered position receiving marbles from the tub.

Fig. 8 is a broken plan and part sectional view illustrating details of the suction holding means for the plates.

Fig. 9 is a broken part sectional view as on line 9—9 of Fig. 8 showing the flexible suction connection with the tub.

Fig. 10 is an enlarged broken sectional detail of two of the mating suction boards.

Fig. 11 is a broken detail illustrating a form of motor drive for the tilting marble trough.

The graining machine shown in Figs. 1 and 2 comprises a graining tub 11, supported on bearings 12, on the frame or base 13, and guided in its orbital plate graining movements by the "diamond frame" indicated at 14, interposed between the base and tub and operating in the manner disclosed in Zarkin Patent 1,935,306 of Nov. 14, 1933.

The tub may be operated as in Patent 1,960,447 of May 29, 1934 by an electric motor indicated at 15, Fig. 2, mounted in one corner of the base with its shaft vertical and driving by belting 16, the centrally located vertical shaft 17, having a crank or eccentric connection with the tub at 17a.

At one end, the tub has a discharge outlet 18, for the marbles or graining materials and the general practise heretofore has been to tilt the tub on the base to effect the discharge of these materials. Thus, as in the patents above identified, the tub has been pivoted at one end as here indicated at 19, to a so-called sub-frame 20, forming a bearer for the tub and a jack 21, was mounted on the end of the sub-frame to lift the free end of the tub. This construction has been practical and entirely satisfactory for tubs up to a certain size, but with larger size plates to be grained and the greater volume of graining marbles necessary, there is a tendency to warp and twist the tub when tilted in this manner. If made more massive to overcome this warping and twisting effect, the tubs become too heavy to be really practical.

One of the features of the present invention is to effect the tilting of the tub, particularly when loaded, by leaving it rest flat on its bearings and tipping the entire base structure.

The tipping axis of the base may be located at one or the other end of the base or at some intermediate point. In the first form of the invention illustrated, the tipping axis is indicated as a hinge rod 22, fixed at 23, to what becomes

the lower end of the base frame and seated in a long hinge socket 24, extending across the end of the sub-frame 25, on which the base normally rests, Fig. 1.

Any appropriate power may be provided for raising the lifting end of the base. In the illustration, such power is illustrated as a powerful hydraulic jack 26, mounted in a rest 27, on the base frame 25, in position to engage a lifting lug or lever projection 28, at the end of the base.

With the particular combination described, that is, with both the tilting base and the tub tiltably mounted on the base, the base may be tipped when the machine is "heavy" with its load of graining materials and, when the tub is "light" or empty the smaller jack 21, may be used to simply tilt the tub. In either situation, the motor may be turned on to traverse the tub in its grain-ing movements. This particular combination also has the advantage that if the tub needs to be tilted at a greater angle than usual, the heavy jack 26 may be first used to tilt the entire machine and then the lighter jack 21 may be used to tip the tub at a still further angle.

When the entire machine is tipped as in Fig. 2, the tub remains fully supported on the base structure and hence there is no straining or warping of the same when operated in this tilted position to discharge the graining marbles.

In the form of the invention illustrated in Figs. 3 and 4, the base of the machine is pivotally supported at a point intermediate its ends and more or less centrally located by means of journals 29, extending out from the sides of the base near the upper end of the same and rotatably supported in bearings 30, carried by stationary side frames 31. This provides a more or less balanced structure which can be rocked with less power than that required in the Fig. 1 construction. The tilting jack in this case is located in a suitable pit 32, so that it may work upwardly against the bottom of the base adjacent one end of the same. A stop is indicated at 33, Fig. 4 to prevent the base rocking back beyond the level position of the tub, but if desired, this stop may be eliminated and the base be permitted to rock beyond the level position to permit the marbles to roll in the opposite direction away from the discharge opening.

In the suspended rocking Fig. 4 construction, suitable blocks or chocks such as indicated at 34, may be inserted or elevated beneath opposite ends or other portions of the base to positively hold it against rocking movements during grain-ing operations, such holding means being removable, lowerable or releasable when the base is to be tilted.

In the large size machines, the marbles or graining elements constitute a heavy bulk of material more or less difficult to handle. In this invention, the handling of such material is simplified and made automatic or partly automatic.

In Fig. 2, the marbles are indicated draining from the lower end of the tub into a holder or trough 35, of greater length than and positioned below the discharge outlet of the tub. This trough is portable and shiftable to lift and turn the marbles back into the tub, it being shown for such purpose as seating in the upper end of a tank 36, on wheels 37, travelling on tracks 38, from the receiving position into an outer position, where the trough is clear of the tub and can be elevated in channel guides 39, high enough to turn the marbles back into the tub, as in Fig. 1.

To assist in guiding and directing the trough

and travelling tank car, a three-sided frame 40, is shown having sides guided at 41, in the channels 39, and slotted at 42, to receive the rollers 43, projecting from the ends of the trough. The ends of the tank car are shown slotted at 44, to receive these same rollers. Lugs 45, 46 on the ends of the trough are positioned to pass through cuts 47, in the flanges of the channels into position to be guided in said channels in the vertical travel of the trough.

To reduce the labor required and make the operation as nearly automatic as possible, levers 48 are indicated pivoted at 49, at opposite sides of the machine having their inner ends equipped with rollers 50, beneath the tilting end portion of the base and having their outer ends equipped with rollers 51, engaging beneath the sides of the travelling elevator frame 40.

After the marbles have been drained out of the tub into the portable receiving trough 35, as in Fig. 2, this trough in its supporting tank is shifted outward or to the right in Fig. 2, into position in the elevator guides. Then when the base is lowered, the levers 48, rocked by the lowering base will raise the guide frame 40, and the trough, through the interlocking connection between the same provided by rolls 43, in slots 42. As the lugs 45, 46, pass upward of the ends of the guide channels 39, the trough can tilt inwardly or forwardly about the rolls 43 as centers, as indicated generally in Fig. 1, to pour the marbles back into the tub. The back or outward lugs 46, may engage the upper edges 52, of the sliding frame to limit the tilting movement of the trough or this trough may be counterbalanced or otherwise suitably controlled for this operation.

The portable marble receiver is indicated as perforated or reticulated at 53, in the nature of a common marble basket, so as to drain in the tank car and the latter may have means for emptying such as a drain cock indicated at 54, to discharge into a suitable drain 55.

The marble basket handling and shifting mechanism shown in Figure 4, is generally similar to that heretofore described in detail, corresponding reference characters having been applied thereto.

A somewhat simpler construction of marble return mechanism is shown in Figs. 5, 6 and 7, comprising in general a receiving trough 56, pivotally mounted at 57, across the lower end of the machine. This tiltable trough has an opening 58, in the side of the same to receive the lower end of the stationary chute 59, Fig. 7, which extends inwardly beneath the discharge outlet of the tub. The inner end of this chute is shown in Fig. 7 as positioned to force back the trapdoor 60, pivoted at 61, to serve as a closure for the trough opening 58. The bottom portion of the tilting trough is shown formed as a perforated marble basket 62, which in the upright position of the trough can drain into a tank or drainage receptacle 63. Any suitable power may be employed for tilting the trough, such as the jack indicated at 64, connected through pivot link 65, with the rock arm 66, on the end of one of the trough journals 57.

The trapdoor 60 which opens to pass the marbles in the receiving position, Fig. 7, is preferably mounted so as to seat flush in the side of the trough as indicated in Fig. 6, in the raised delivery position of the trough and the edges of the trough may be converged inwardly as indicated at 67, Fig. 5, so as to deliver the marbles smoothly and evenly back into the tub.

Another feature of the invention is the securing of the plates in the graining tub without external fastenings, so as to leave the entire surface of the plates exposed for graining action.

This is effected in the illustration by means of suction hold-downs shown in Figs. 8, 9 and 10, as small suction openings 68, in the hollow base-boards 69, secured on the floor of the tub. These boards may be made in unit sections as indicated particularly in Figs. 8 and 10, adjoining sections having pin and socket engagement 70, 71, insuring their flush alignment on the floor of the tub. As many of these board units may be used as required, according to the size of the plate, which latter is indicated at 72, Figs. 8 and 9, lying on the suction boards and covering the small suction cups or openings 68.

Suction connections are indicated at 73, extending off from the suction boards and these may be manifolded as indicated at 74, to an inverted elbow 75, dipping over the edge of the tub and having a more or less flexible hose connection 76, extending downwardly to a suction line 77. This generally vertical hose connection allows for both the oscillating graining movements and the tilting marble discharge movement of the tub.

To save unnecessary lifting of additional weight, the operating motor 15 as indicated in Fig. 2, may be located in the lower end portion of the tilting base at or adjoining the pivoting center. In a construction such as indicated in Fig. 4, with the base pivoted at an intermediate center, the motor then may be located in a more or less intermediate position adjoining the pivotal axis. A suitable water trap may be located at some convenient point in the suction line, such as indicated at 78, in Fig. 9.

In the semi-automatic form of marble return embodied in the first form of the invention illustrated, the weight of the marble lifting mechanism counterbalances more or less the weight of the lowering machine as it returns to horizontal position and in the opposite, raising movement the lever mechanism engaging beneath the base, also exerts some kind of counterbalancing effect.

To stop the trough in proper position at the end of its lowering movement, the ends of the trough are shown in Fig. 5 as carrying projecting stop lugs 80, to cooperate with the backs of the standards or posts 81, on which the trough is journaled. The trough may be counterbalanced more or less, as indicated by the counterbalance weights 82, applied to the journals 57.

To carry the side thrust loads on the moving stem of the hydraulic jack 64, this stem is shown in Figs. 5 and 6 as carrying at its pivotal connection with link 65, a roller 83 operating in a substantially vertical guide 84.

The jack or jacks may be operated by hand or power and either for tilting the machine or for tilting the marble return trough.

In Fig. 11, a power system for operating the marble return trough is illustrated comprising a motor 85, operating through worm gearing reduction drive 86, to rock the trough 56, on its journals 57.

The jack or jacks for tilting the machine or for lifting the graining tub (26 and 21, Fig. 1) may be motor driven as indicated in the broken detail view, Fig. 1a, where a motor is shown at 87, operating through reduction gearing 88, a crank 89, operating the jack lever 90, through a

connecting link 91. This motor mechanism may be directly attached to and thus constitute a part of the jack structure, substantially as indicated and starting, stopping and reversing of the motor is governed by suitable control mechanism which may include a limit switch for preventing such over-running of the motor as might tilt the machine too far. With motor operation and remote control, the graining tub or the entire machine may be tilted as required and while the machine is in operation.

This same feature of remote control may be applied as indicated in Fig. 2a, where the tub tilting jack 21 is indicated as supplied with fluid under pressure through a flexible hose line 92, from a conveniently located stationary pump mechanism 93, operable by hand or motor driven jack lever 90.

What is claimed is:

1. In a plate graining machine, the combination of a graining tub, a base on which said tub is mounted for plate graining movements, driving means on said base for imparting the plate graining movements to said tub and means for tilting said entire base structure to thereby tilt the graining tub without changing its mounting on the base and without changing the relation of said driving means and tub.

2. In a plate graining machine, the combination of a base, a graining tub directly supported on said base, a motor in the base for imparting graining movements to said tub and means for tilting the base and the motor mounted therein without changing the supported relation of the graining tub on the base.

3. In a plate graining machine, the combination of a tiltably mounted graining tub, a stationary chute positioned to receive graining material discharged from the tub by the tilting of the same and a pivotally mounted return trough adapted in one position to receive graining material from said chute and in another position to return graining material back into the tub.

4. In a plate graining machine, the combination of a tiltably mounted graining tub, a stationary chute positioned to receive graining material discharged from the tub by the tilting of the same and a pivotally mounted return trough adapted in one position to receive graining material from said chute and in another position to return graining material back into the tub, said trough in its receiving position standing substantially vertical and having a trapdoor in the side of the same in line with the discharge end of said chute.

5. In a plate graining machine, a graining tub and suction means in said graining tub for holding plates to be grained therein and including suction chambers secured on the floor of the tub and having interfitting engagement assuring flush alignment at the floor of the tub.

6. In a plate graining machine, a graining tub and suction means in said graining tub for holding plates to be grained therein and a generally vertical suction hose connection flexible to permit graining movements of the tub.

7. In a plate graining machine, the combination of a graining tub mounted for plate graining and tilting movements, suction plate hold-down means in the bottom of the tub and suction connections to said means flexible to permit plate graining and tilting movements aforesaid.

8. In a plate graining machine, a base, a graining tub mounted for plate graining movements

on said base, means for tilting said tub on the base and means for bodily tilting the base.

9. In a plate graining machine, a base mounted for tilting movement about a pivot center at one 5 end of the same, means for tilting the base about said pivot center and a plate graining tub mounted for graining movements on said base.

10. In a plate graining machine, a base mounted for tilting movement about a pivot center at 10 one end of the same, means for tilting the base about said pivot center and a plate graining tub mounted for graining movements on said base and a motor for effecting the graining movements of the tub, said motor being mounted on 15 the base at or adjoining said pivoted end of the base.

11. In a plate graining machine, a base, means for pivotally supporting the same intermediate the ends of the same, a graining tub mounted 20 for plate graining movements on said base and means for swinging said entire base on its pivotal mounting.

12. In a plate graining machine, a base, means for pivotally supporting the same intermediate 25 the ends of the same, a graining tub mounted for plate graining movements on said base, means for swinging said entire base on its pivotal mounting and means for blocking said base against tilting movements.

13. In a plate graining machine, a graining 30 tub, an elevator structure at one end of the same, a marble basket and means for shifting said marble basket from a position beneath one end of said tub into position in said elevator 35 structure and for elevating the same to a marble return position in the latter structure.

14. In a plate graining machine, the combination of a graining tub, a base on which said tub is mounted for plate graining movements, power 40 mechanism on said base for imparting the plate graining movements to said tub, means for tilting said entire base structure to thereby tilt the graining tub without changing its mounting on the base or altering the driving relation between 45 said power means and tub, a receiver for graining material used with the tub and connections operable by return movement of the tilted base structure to elevate said receiver and whereby the weight of the base structure is utilized to lift the graining material for return to the tub.

15. In a plate graining machine, the combination of a tiltably mounted graining tub, a stationary chute positioned to receive graining material discharged from the tub, a pivotally 5 mounted trough adapted in one position to cooperate with said chute to receive graining material therefrom and in another position to be clear of said chute and to return graining material back into the tub, said trough having a 10 perforate portion which is lowermost in the material receiving position of the trough and a stationary drainage receptacle located beneath said perforate portion of the trough in said first mentioned position of the same.

16. In a plate graining machine, a graining 15 tub, means for effecting tilting of the same to run off the graining marbles, a stationary chute positioned to receive marbles run off from the tilted tub, a pivotally mounted trough located to receive the marbles from said chute in one position 20 and to swing clear of said chute for delivering the marbles back into the tub and power means for swinging said chute to return the graining marbles back into the tub.

17. In a plate graining machine, a graining tub 25 having a passage in the lower portion of the same for discharging graining material, means for effecting tilting of the tub to discharge the graining material through said bottom opening, a discharge chute extending beneath said discharge 30 opening to carry off the graining material and a trough pivotally mounted adjacent the discharge end of said chute, said trough having a trap door in the side of the same adjoining the discharge 35 end of said chute, adapted to open to pass the graining material from said chute into said trough, said trough having a drainage bottom portion for holding the graining material so received and said trap door in the side of said 40 trough being mounted to automatically close as the trough is swung away from the discharge chute to thereby form a continuous portion of the side wall and said side wall in the elevated position of the trough extending over the top of the 45 graining tub for returning the graining material which has been drained therein back into the tub.

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