A. MEYN.

PICKLING AND WASHING MACHINE FOR METAL PLATES.

APPLICATION FILED DEC. 1, 1910. RENEWED JAN. 30, 1913.

1,066,298.

Patented July 1, 1913.

3 SHEETS—SHEET 1.

FIG. 2

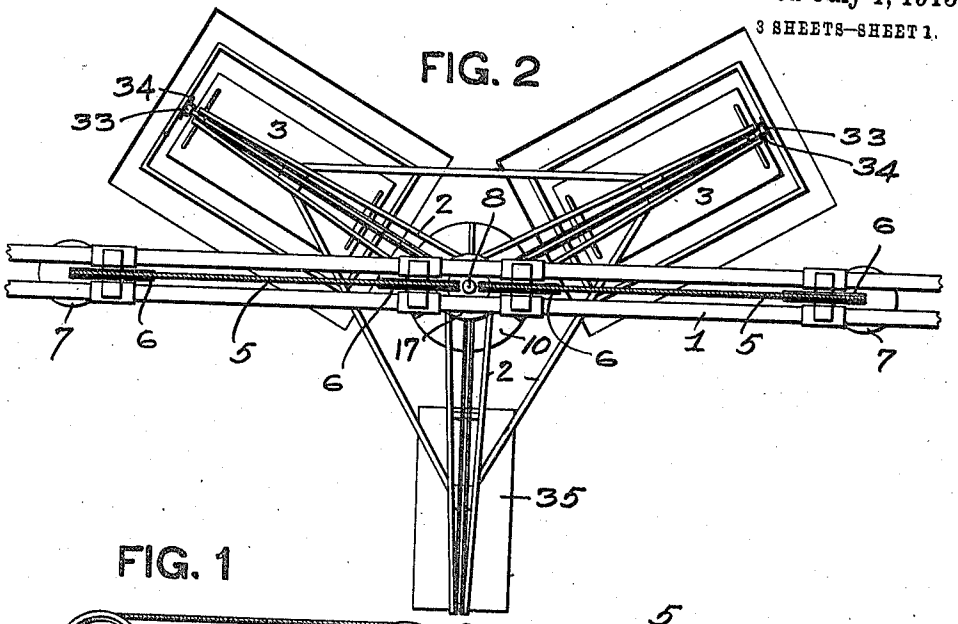
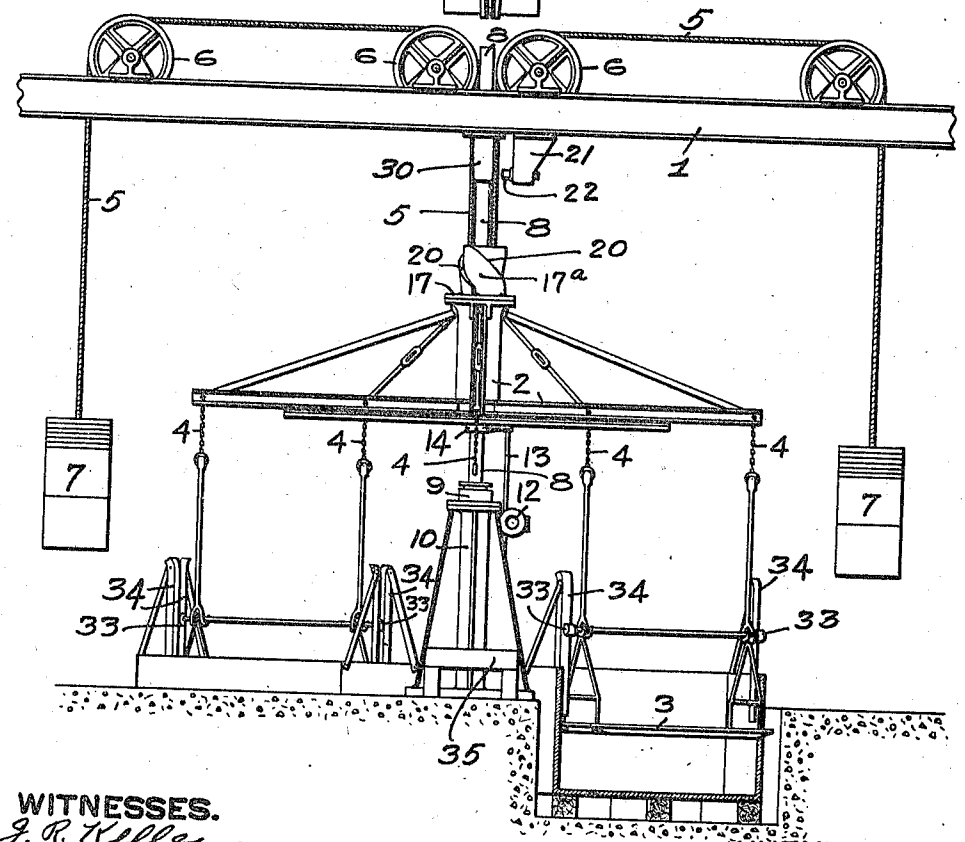



FIG. 1




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FIG. 3

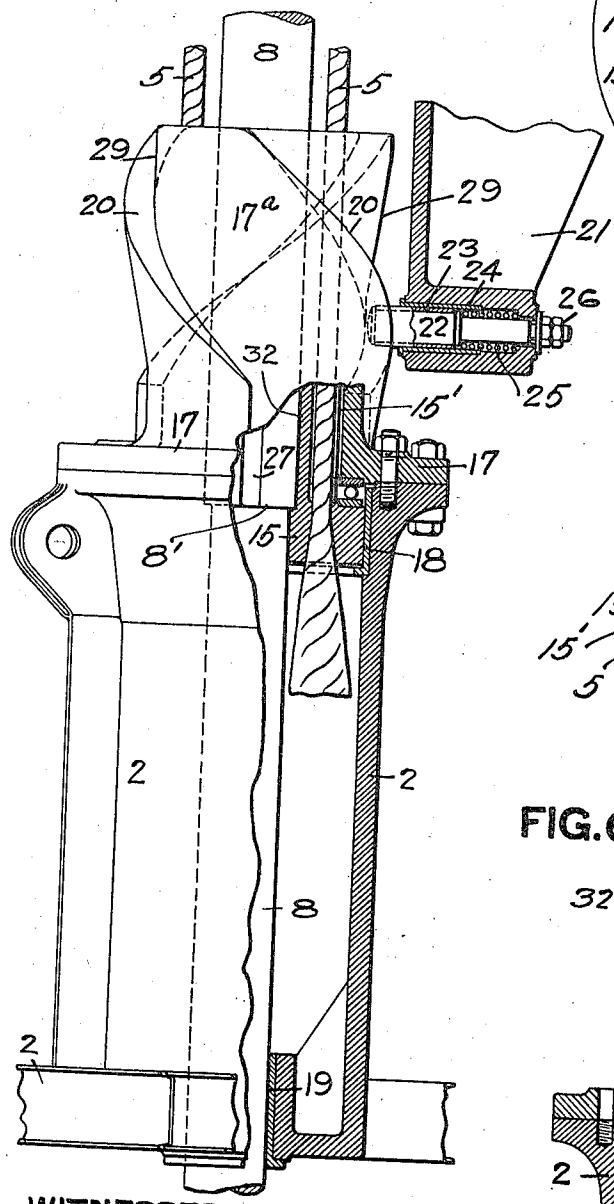



FIG. 4

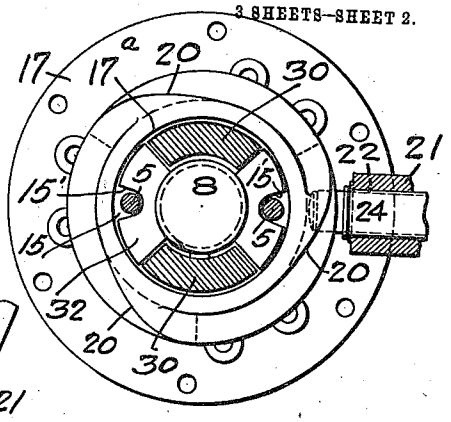



FIG. 5

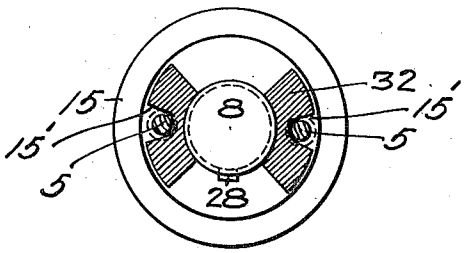
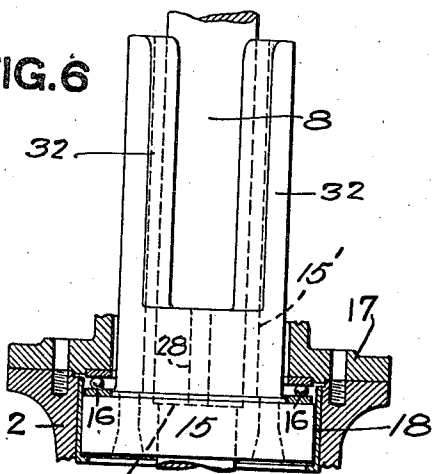



FIG. 6




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3 SHEETS—SHEET 3.

FIG. 7

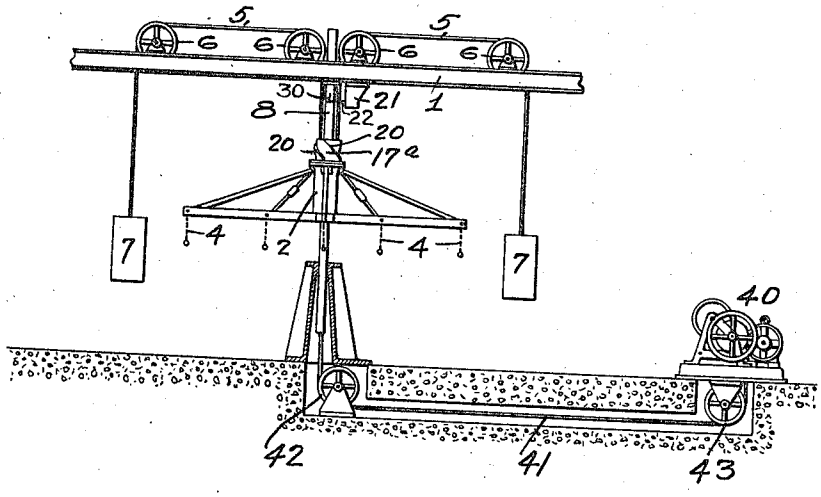
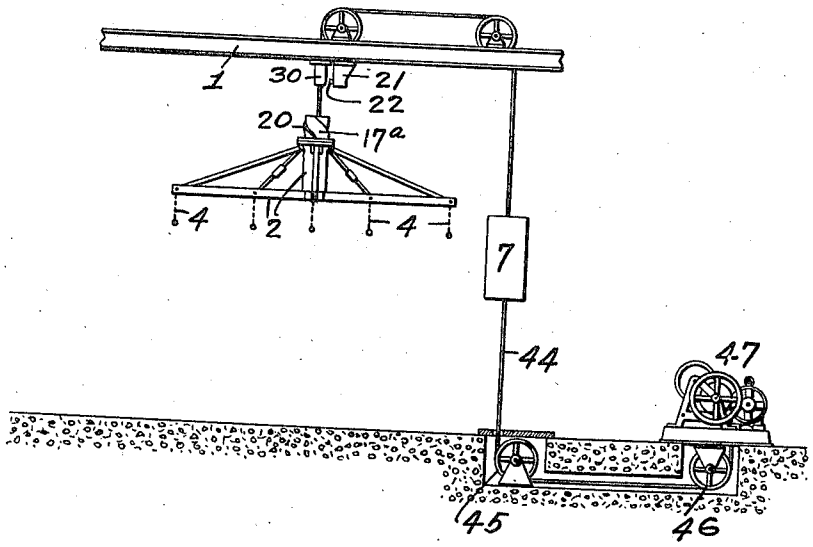



FIG. 8




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# UNITED STATES PATENT OFFICE.

ADOLF MEYN, OF PITTSBURGH, PENNSYLVANIA.

## PICKLING AND WASHING MACHINE FOR METAL PLATES.

1,066,298. Specification of Letters Patent. Patented July 1, 1913.

Application filed December 1, 1910, Serial No. 595,050. Renewed January 30, 1913. Serial No. 745,290.

*To all whom it may concern:*

Be it known that I, ADOLF MEYN, a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Pickling and Washing Machines for Metal Plates; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to pickling and washing machines for metal plates, and relates more particularly to that type of machine in which the plates are carried in crates that are suspended from a spider adapted to be agitated up and down when the plates are in the bath, or to be lowered and lifted to and from the bath.

The main object of my invention is to reduce the amount of power required to agitate the crates and at the same time to provide an effective and simple means for swinging the spider automatically a predetermined distance, so as to bring the crates around in proper position for lowering into their respective baths.

To these ends my invention comprises the novel features hereinafter set forth and claimed.

Referring to the drawings, Figure 1 is an elevation of the machine with a section taken through one of the vats; Fig. 2 is a plan view; Fig. 3 is an enlarged view partly in section showing the manner of securing the ropes to the spider; Fig. 4 is a plan view with the top clutch members in section and the bracket for the cam-pin; Figs. 5 and 6 are details; and Figs. 7 and 8 show modified forms of my invention.

Referring to the drawing, the numeral 1 designates the frame from which is suspended the spider or crate-frame 2. The crates 3 are suspended by means of chains 4. The ropes or chains 5 are connected to the spider in the manner more fully hereinafter set forth, and such chains pass over the sheaves 6, counterweights 7 being secured to the ends of said ropes or chains. The sheaves 6 are carried by the frame 1 and said frame forms a guide for the guide-rod 8 by means of which the spider is guided, so as to prevent the said spider from tipping when unequally loaded, and said guide-rod moves up and down with said spider. This guide rod 8 passes through a stuffing-box 9 in the cylinder 10 and carries a piston-head at its lower end within said cylinder.

Suitable valve-mechanism 12 is operated automatically by a rod 13 to control the valve to the cylinder 10. The rod 13 is carried by the bracket 14 secured to the guide-rod 8 and moved up and down by it. It is not deemed necessary to illustrate this valve-mechanism as it may be any well known construction employed for such purposes. The valve-mechanism 12 controls the short strokes in the agitation of the crates when in the vats, and the lifting or lowering of the spider in removing the crates from the vats or lowering them thereto is accomplished by a suitable hand-lever connected to said valve-mechanism.

In Fig. 3 I have illustrated more in detail the manner in which the ropes 5 are secured to the spider. The guide-rod 8 has a shoulder 8′ upon which is keyed the supporting ring 15 with the openings 15′ to receive the ropes 5 which are enlarged at their ends so as to prevent their withdrawal therefrom. A groove 27 is formed in the guide-rod and a key 28 engages said groove and a groove in said ring 15 to keep said ring from turning. The spider ring 15 has the thrust bearing 16 extending around outside the ropes 5; said thrust bearing may be an ordinary ball-bearing. On this bearing the upper bearing part 17 rests which is secured by bolts to the hub of spider 2. Bushings 18 and 19 are provided for the turning of the spider around the rod 8 and ring 15. The upper bearing part 17 has an upper cylindrical extension 17ª outside the ropes 5 and said extension comprises a series of cams 20 equal in number to the number of arms on the spider. As there are three arms in the present instance, there are three cams which each act to revolve the spider through one-third of a circle. Each cam is provided with the tapered portion 29 on the under side for the purpose fully hereinafter set forth.

A bracket 21 is secured to the beams 1 of the frame and serves to carry the pin 22 with its bushing 23 which moves in the bushing 24, and said pin is normally forced out by the spring 25, which is controlled by the adjusting nut 26. In the lifting of the spider the cam 20 presses against the bushing 23 of the pin and forces the spider to turn around the guide-rod and ropes, and when the spider is lowered the tapered portion 29 of the under side of the cams presses the pin 21 back until the cam is lowered

clear of it, whereupon the spring 25 will bring the pin back to its former position.

Extending up from the ring 15 are the clutch-arms 32 which are adapted to engage the clutch-arms 30 extending down from the frame 1 which prevent the turning of the guide-rod, as fully hereinafter set forth. As the apparatus stands vertically the ropes pull vertically upward and as the crates hang vertically down from the arms of the spider guided by pins 33 on said crates engaging the stationary guides 34, no turning of the guide-rod can take place and consequently there is no twisting of the ropes. Any slack in accuracy of the directing of the apparatus can easily be taken care of by a slight turning of the spider in its thrust bearing.

The operation of the machine is as follows: In a three-arm machine of the type illustrated, there will always be two crates in the vats to be agitated and when the spider is lifted to withdraw the crates from the vats, a third crate will be attached to the third arm of the spider and the spider carrying the three crates is lifted and turned the required distance to bring the crate just added into position over the first vat and the crate over the second vat around in position to be unloaded. The raising of the spider with the crates suspended therefrom is always accomplished by the weights 7, while the lowering is done by pressure such as steam or air admitted to the upper end of the cylinder 10 to lower the guide-rod. As the counterweights are so dimensioned that they have "a surplus weight" above the total weight of all the parts to be moved up and down, that is, the complete spider with its guide-rod 8, rod 13, and a loaded crate on each arm together with the friction to be overcome, said surplus weight will always pull the spider upward, so that to pull the spider down when the crates are agitated, it is necessary to apply power equal to the sum of the surplus weight, the weight of one removed loaded crate and the loss of weight of those parts that are immersed in the fluid of the vat. When the agitation has been carried on to the required extent, a loaded crate is hooked to the unloaded arm of the spider and the power shut off whereupon, the weights raise the crates out of the vats. At the time the guide-pins 33 of the crates get clear of the guides 34 the clutch-arms 30 and 32 become engaged thereby preventing the turning of the guide-rod, and while the spider is still rising, one of the cams 20 will engage the pin 22 and so force the upward moving spider to turn around the guide-rod with its ropes until the lower end of said cam engages the pin 22, which stops the turning of the spider. The spider in this way is swung around the fraction of the circle required to bring the crates into proper position with reference to the vats. Power is applied to the cylinder and the pull of the surplus weight is overcome to lower the spider until the crate carrying the finished plates reaches the loading table 35, and is unhooked for unloading, whereupon the short or agitating strokes are then given to the spider as before.

As will be observed the greatest amount of power for lowering is required when one crate is removed and the others are in the vats, but power has been saved to move the combined weight of the guide-rod and spider with all but one loaded crate. In order to cut this amount down, I may hang on the empty arm a special weight which is approximately as heavy as the removed crate with its load, so that I only need a pull equal to the sum of the surplus weight plus the increase of pull of the balance weights 7 due to the loss of weight of the crates immersed in the vats. This special weight has also the advantage of preventing a one-sided wear in the bearings for the guide-rod. Even the power to overcome the increased pull of the balance-weights 7 due to the loss of weight by dipping the crates into the vats may be saved by adding to the above mentioned special weight an additional weight so that an almost perfect counterbalance is obtained.

In Fig. 7 I have illustrated a modified form of my invention in which the lowering is done by an electrically driven winding apparatus 40 equipped with a brake. The rope or chain 41 is connected to the lower end of the guide-rod, said rope passing around the sheaves 42 and 43 which may be located below the floor-line.

In Fig. 8 I have shown another form of my invention in which only one chain or rope 44 is employed for suspending the spider, said chain passing around the sheaves 45 and 46 to the winding-mechanism 47. In this case the spider is always pulled down by its own weight, and has to be pulled up by means of power such as the electrical winding-apparatus 47. In this construction the guide-rod is omitted but the crates are guided as illustrated in connection with Figs. 1 and 2. The special weight is employed on the unloaded arm of the spider to prevent the spider from tilting. In this arrangement there is as much left unbalanced as was overbalanced by the surplus weight in the former described arrangement so that the spider in this case is always pulled down by its own weight, and has to be pulled up by means of power such as the electric winding apparatus illustrated.

What I claim is:

1. In pickling and washing machines, the combination with a suitable support and a plurality of vats, of a rotary and vertically

movable crate-carrying frame, means for raising and lowering said crate-frame, and means operative by the movement of the crate-frame to turn said frame.

2. In pickling and washing machines, the combination with a suitable support and a plurality of vats, of a rotary and vertically movable crate-carrying frame, means for raising and lowering said crate-frame, and means in the path of said crate-frame in operative position with reference to means on said support to turn said crate-frame.

3. In pickling and washing machines, the combination with a suitable support and a plurality of vats, of a rotary and vertically movable crate-carrying frame, means for raising and lowering said crate-frame, a cam device and means engaging said cam device in the vertical movement of said crate-frame to turn the same.

4. In pickling and washing machines, the combination with a suitable support and a plurality of vats, of a rotary and vertically movable crate-carrying frame, means for raising and lowering said crate-frame, a cam-device carried by said crate-frame, and means in the path of said crate-frame engaging said cam to turn said crate-frame.

5. In pickling and washing machines, the combination with a suitable support and a plurality of vats, of a rotary and vertically movable crate-carrying frame, means for raising and lowering said frame, a cam carried by said frame, and means in the path of the upward movement of said crate-frame adapted to engage said cam to turn said crate-frame.

6. In pickling and washing machines, the combination with a suitable support and a plurality of vats, of a rotary and vertically movable crate-carrying frame, means for raising and lowering said crate-frame, a cam carried by said crate-frame, and a yielding pin in the path of said cam adapted to engage said cam to turn said crate-frame.

7. In pickling and washing machines, the combinaion with a suitable support and a plurality of vats, of a rotary and vertically movable crate-carrying frame, means for raising and lowering said crate-frame, a cam-device having a plurality of cams corresponding to the number of crates carried by said frame, and a yielding pin in the path of the said cam-device adapted to engage said cams to turn said crate-frame.

8. In pickling and washing machines the combination with a suitable support and a plurality of vats, of a rotary and vertically movable crate-carrying frame, means for raising and lowering the same, a cam device having a plurality of cams corresponding to the number of crates carried by said crate-frame, and a pin in the path of the upward movement of said crate-frame adapted to engage said cams to turn said crate-frame.

9. In pickling and washing machines, the combination with a suitable stationary support and a plurality of vats, of a rotary crate-carrying frame, a guide-rod for said crate-frame, ropes connected to said crate-frame, weights carried by said ropes and suspended from said support, power-driven means for lowering said guide-rod and the crate-frame mounted thereon, said crate frame being elevated by said weights, means for automatically turning said crate-frame on said guide rod, and means for holding said ropes against twisting during the turning of said crate-frame.

10. In pickling and washing machines, the combination with a suitable support and a plurality of vats, of a crate-carrying frame, a guide-rod for same, a non-rotary ring-like member carried by said rod, ropes secured to said ring-like member, said crate-carrying frame adapted to rotate around said member, power-driven means for lowering said guide-rod, and weights secured to said rope.

11. In pickling and washing machines, the combination with a suitable support and a plurality of vats, of a crate-carrying frame, a guide-rod for said crate-frame, a non-rotary ring-like member secured to said rod, ropes engaging said member, said crate-carrying frame rotatable around said member, power-driven means for lowering said guide-rod, weights carried by said ropes for raising said crate-frame, and clutch-mechanism for holding said ring-member and guide-rod against rotary movement when said crate frame is rotated.

12. In pickling and washing machines, the combination with a suitable support and a plurality of vats, of a crate-carrying frame, a guide-rod for said crate-frame, a ring-member, said crate-frame rotatable around said ring-member, power-driven means for lowering said guide-rod, weights carried by said ropes for raising said crate-frame, and clutch-members carried by said ring-member adapted to engage clutch-members on said support when said crate-carrying frame is lifted.

In testimony whereof, I the said ADOLF MEYN have hereunto set my hand.

ADOLF MEYN.

Witnesses:
ROBERT C. TOTTEN,
JOHN F. WILL.