Oct. 18, 1932. C. L. TAYLOR 1,883,092

MACHINE FOR PICKLING SHEETS AND THE LIKE

Filed Sept. 23, 1929 5 Sheets-Sheet 1

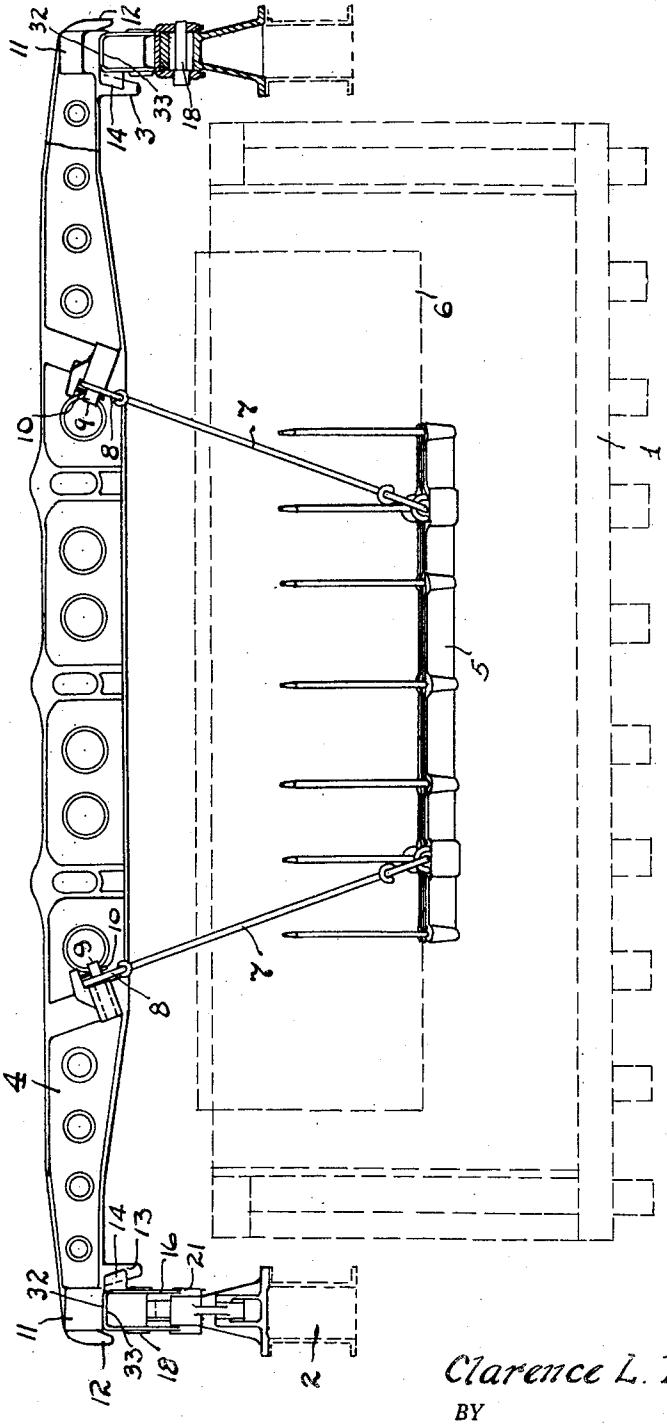


Fig. 1

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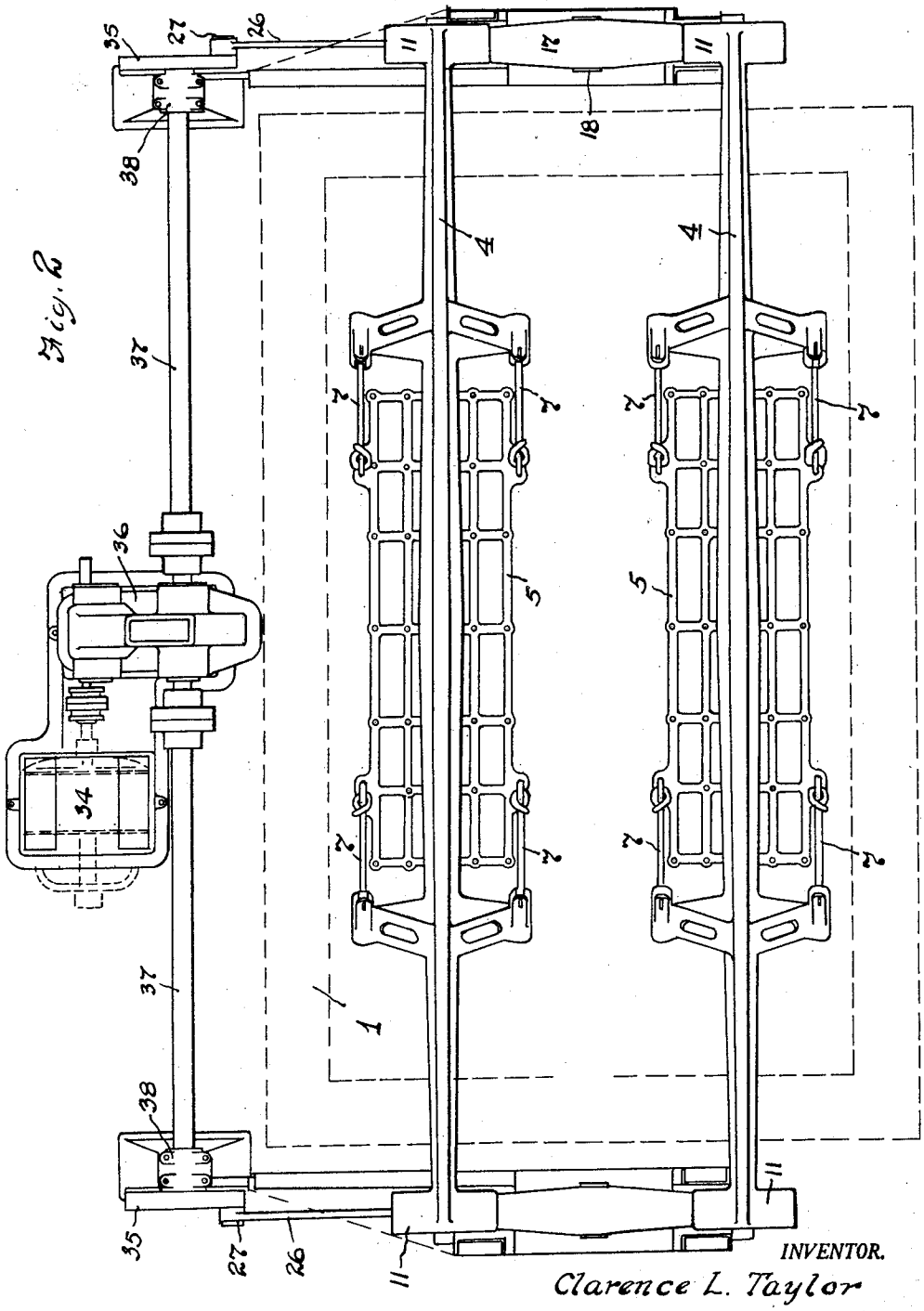


Fig. 2

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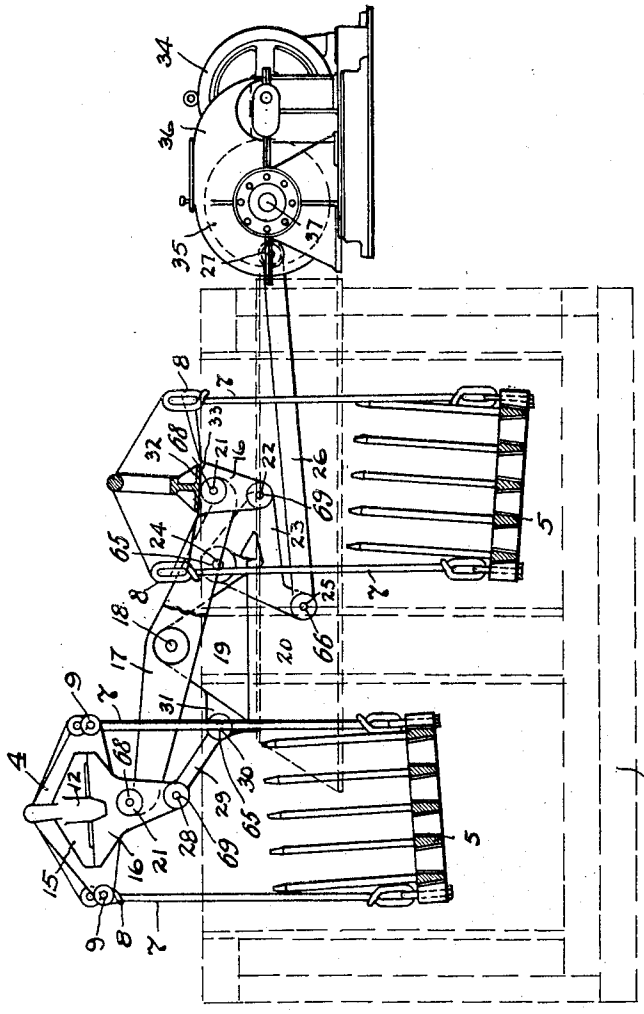


Fig. 3

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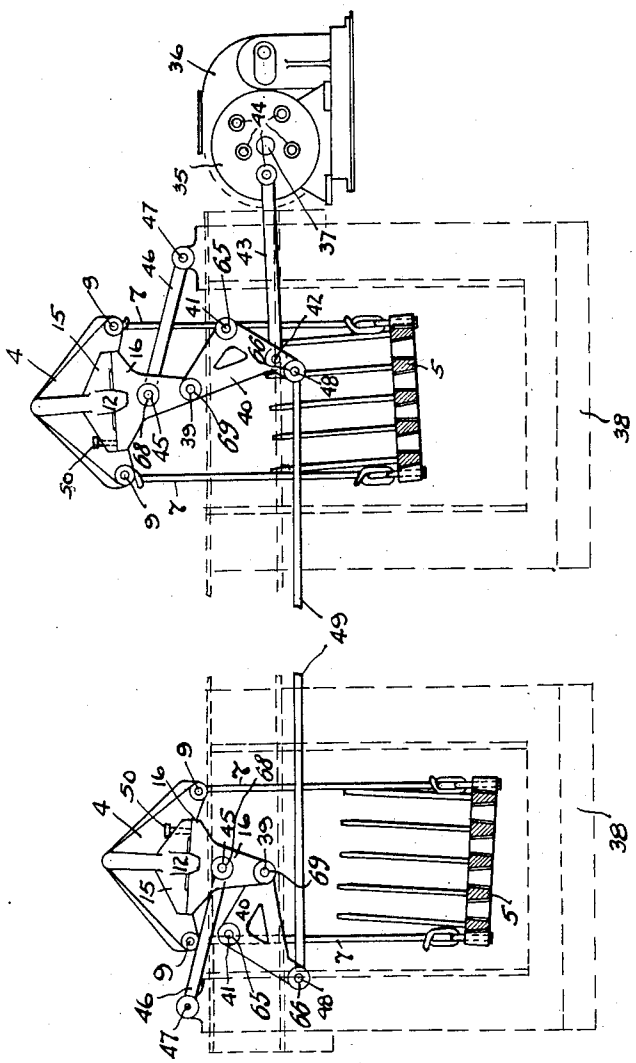


Fig. 4

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MACHINE FOR PICKLING SHEETS AND THE LIKE

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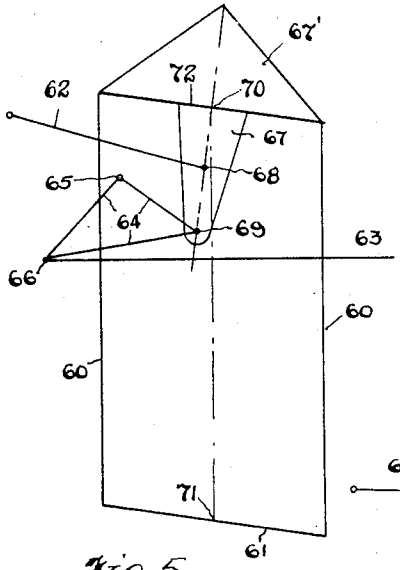


Fig. 5

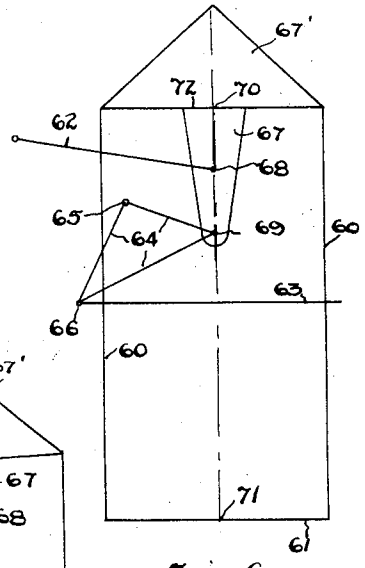


Fig. 6

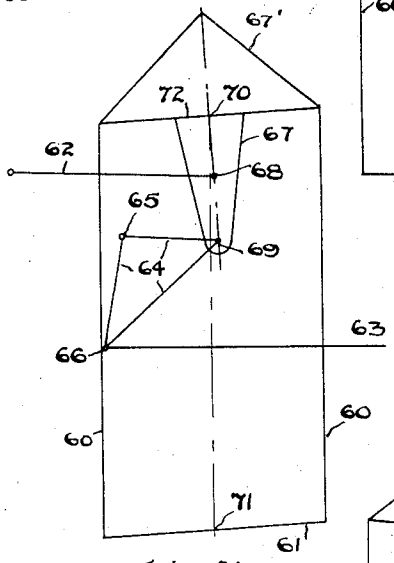


Fig. 7

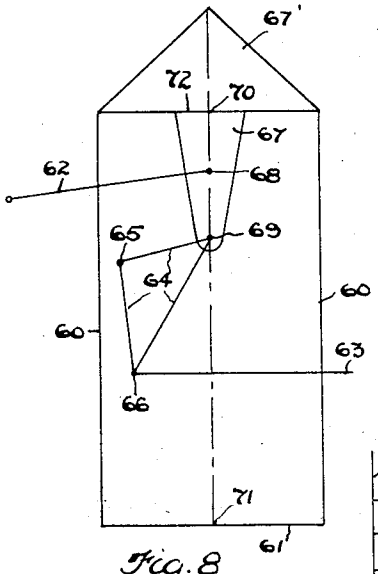


Fig. 8

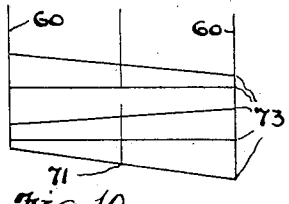


Fig. 10

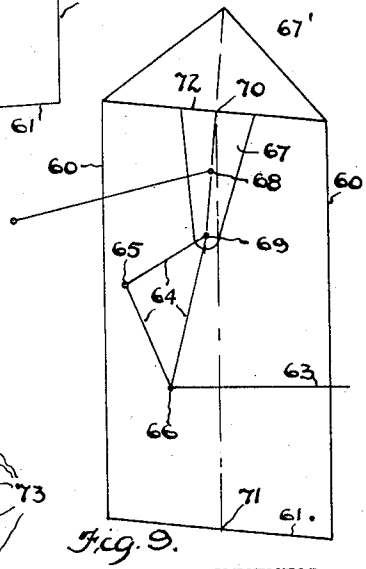


Fig. 9.

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1,883,092

UNITED STATES PATENT OFFICE

CLARENCE L. TAYLOR, OF YOUNGSTOWN, OHIO

MACHINE FOR PICKLING SHEETS AND THE LIKE

Application filed September 23, 1929. Serial No. 394,405.

My invention, as indicated, relates to machines for pickling sheets and the like and has particular reference to the mechanism by which the crates or containers in the pickling tanks are actuated and has for an object to provide a crate actuating mechanism which shall impart to such sheet supporting crates a plurality of movements to best accomplish the pickling process. A further object of my invention is to provide a mechanism which is peculiarly adaptable to a plurality of tanks whereby such tanks may be operatively connected regardless of their position with respect to each other either in a horizontal or vertical plane. Other objects of my invention will appear as the description proceeds.

In pickling tanks of the type commonly employed, the mechanism consists of a spider or a walking beam which support the crate members in the pickling bath, and when such spiders or walking beams are actuated, a vertically reciprocal motion is transmitted to such crates in the pickling bath. Some of the disadvantages of the present types of construction are that they do not permit of pickling vats being placed in positions other than immediately contiguous to each other and also that the movement imparted to the sheet carrying crates in the pickling bath is restricted to a purely vertical reciprocation. In the apparatus of my invention pickling baths or tanks may be disposed at any desirable place about the factory building and may be connected by a tension member which serves the dual purpose of counterbalancing loads in the various tanks as well as transmitting the actuating force from one tank to another.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawings and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Fig. 1 is a part section and part elevation of a pickling tank embodying the principle of my invention; Fig. 2 is a plan view of the tank shown in Fig. 1; Fig. 3 is a part elevation and part section of a pickling tank showing in detail the operating mechanism; Fig. 4 is a broken part section and part elevation view of two pickling tanks embodying the principle of my invention; and Figs. 5, 6, 7, 8, 9 and 10 are diagrammatic views showing the various positions of the crate and operative mechanism during a complete cycle of reciprocation.

Referring to the drawings and more especially to Fig. 1, the pickling tank 1 here shown in dotted outline has disposed adjacent its ends supporting members 2 which support the cross member 4 which has depending therefrom a crate 5, the crate 5 supporting a pack of sheets 6 shown in dotted outline. The crate 5 is supported from the cross member 4 by means of a plurality of supporting members 7 which are removably attached to the cross member 4 by means of a loop 8 formed integrally with the end of the supporting member 7, being held in operative position by means of the lugs 9. Pins 10 passing through the lugs 9 prevent the loops 8 from sliding off the lugs 9 and when such pins 10 are removed permit the supporting members 7 to be detached from the cross member 4. The cross members 4, as shown in Fig. 2, are usually two in number and so arranged that the loads carried by the crate 5 are counterbalanced so that a minimum of power need only be expended in reciprocating the crates in the pickling bath. The cross members 4 have their ends 11 formed with downwardly extending lugs 12 which secure the cross members 4 against endwise motion with respect to the supports upon which they rest. The cross member 4 has also downwardly extending therefrom lugs 13 which lie between a plurality of lugs 14 formed on the supports and prevent lateral motion of the cross member 4 with respect to the supports. The ends 11 of the cross members 4 have also formed therewith projections 15 adapted to rest upon the supporting heads 16 while in operative position.

One method of adapating the principle of

my invention, as illustrated in Fig. 3, consists of a walking beam 17 rotatably supported at 18 on the member 19 which is rigid with respect to the framework of the pickling apparatus and may be supported on the I beam 20, shown in dotted lines on Fig. 3. The walking beam 17 has its ends formed with rotatable supports 21 which are adapted to receive the supporting members 16. The supporting member 16 of one unit of the apparatus and may be supported on the I beam 22 a bell crank 23 which is supported on a fixed pivot at 24 and to which is connected at 25 a pitman 26, the other end 27 of the pitman 26 being suitably connected to a rotating head for actuating the mechanism. The supporting head 16 of the mechanism of the other pickling tank has connected thereto at 28 an arm 29 which at its other end 30 is rotatably supported by a rigid support 31. The cross member 4 has a bearing surface 32 formed at the ends thereof which rests upon a complementary bearing surface 33 of the supporting member 16. In this particular arrangement of the mechanism, the motor 34 which is connected to the rotary head 35 by means of a suitable speed reducing mechanism 36 drives the shaft 37, as shown in Fig. 2, which is journaled at its ends in bearings 38 and to which are connected the rotary heads 35 which drive the pitmans 26. The pitmans 26 in turn actuate the bell cranks 23 and impart to the supporting heads 16 the operative motion during the pickling process. The details of this operative motion are illustrated in detail in Figs. 5 to 10, inclusive, and will be hereinafter more fully explained.

Another embodiment of my invention, as shown in Fig. 4, consists of a plurality of pickling tanks 38 which may be in various positions with respect to each other. Cross members 4 and supporting members 16, similar to those illustrated and employed in the apparatus of Fig. 3, support in like manner the crates 5 in the several tanks. In this embodiment of my invention each of the supporting heads 16 has rotatably connected thereto at 39 bell cranks 40 which are supported on fixed pivots at 41. One of the bell cranks 40 has connected thereto at 42 a pitman 43 which is in turn connected to the rotary head 35 at one of several points 44. The means 44, by which the pitman 43 is connected to the revolving head 35, are spaced at varied distances from the axis of rotation of the revolving head and the travel of the pitman 43 can be controlled by connecting it to any of the means 44. The supporting heads 16 have movably secured thereto at 45 arms 46 which are in turn pivotally supported on rigid supports at 47. The lower ends 48 of the bell crank members 40 are interconnected by means of a member 49. The bell cranks 40 of the several tanks are so arranged that when one of the crates is in the uppermost position, the crate in the other tank will be in the lowest position, the bell cranks 40 being connected by the member 49, the loads on the supporting head 16 are counterbalanced, the load in the right hand tank in its downward travel materially assisting in elevating the load in the left hand tank. It will be seen from an inspection of Fig. 4 that when the material supporting tray 5 in one tank is moved upwardly, the tray in the other tank will be moving downwardly. As illustrated in this figure, the tray 5 in the left hand tank is substantially at the bottom of the cycle, whereas the right hand tray is substantially at the top of the cycle. Therefore, as the tray in the right hand tank descends, the considerable weight of the tray and its load, and the associated mechanism will cause a counter clock-wise rotation of the bell crank 40 associated with this mechanism. Counter clock-wise rotation of this bell crank 40 will cause a linear movement of the member 49 to the right. The member 49 moving to the right under the influence of the load acting on the bell crank 40 associated with the mechanism in the right hand tank and supplemented by the force of the arm 43 will cause a counter clock-wise rotation of the bell crank 40 associated with the left hand tank about its point of pivotal support 41, so that the tray 5 in the left hand tank will be moved upwardly. By proper control of the length of the member 49 the two trays can be made to reach the opposite ends of the cycle of operation at exactly the same time, so that as the left hand tray starts downwardly, the right hand tray will start upwardly. The left hand tray in its descent, due to the weight of the load carried thereby, and in addition, the weight of the apparatus itself, will maintain the element 49 in tension and assist the pitman 43 to effect a clock-wise movement of the right hand bell crank 40, and a consequent elevation of the right hand tray. It will be seen from the arrangement of the bell cranks 40 that the member 49 may be simply a tension member and therefore a cable might be employed, making it possible for the two tanks to be almost any distance apart and they need not be in the same horizontal plane. Positioned within the element 15 on the end 11 of the cross member 4 which rests upon the supporting heads 16 is an adjustment screw 50 for changing the angle between the plane of the points 9, 9, and the plane of the points 45 and 39. The result accomplished by a change of this angle will be more fully explained.

The operation of the mechanism of my invention is diagrammatically illustrated in Figs. 5 to 10, inclusive. In these figures, 60 is employed to designate the supporting member 7, 61 designating the plane of the bottom of the crate. 62 designates either the right hand end of the walking beam 17 of Fig. 3, or

the arms 46 of Fig. 4. 63 represents either the pitman 26 of Fig. 3 or the element 49 of Fig. 4. The bell cranks 40 and 23 are represented by the triangle 64 which is pivoted at the point 65, representing fixed pivots 24 and 41, and connects with the pitman at 66 representing bell-crank connecting pivots 25 and 48. The supporting heads 16 are represented by the element 67 and the end 11 of the cross member 4 is represented by the triangle 67'. The element 62 is pivotally connected to the element 67 at 68, representing the movable head-centering pivots 2 and 45 and the element 64 is pivotally connected to the element 67 at 69 representing the crank to head connecting or rocking and tilting pivots 22 and 39. The position of the various elements, as illustrated in Fig. 5, corresponds to their position when the crate is in the lowest position of the cycle of reciprocation. In this position it will be noted that the points 68 and 69 lie on a line making an angle with a vertical line passing through the midpoint 70 of the lower side of the triangle 67' and the midpoint 71 of the line 61 designating the plane of the bottom of the crate.

In Fig. 6 the positions of the elements here illustrated is that which they occupy after the bell crank 40, which is here represented by the triangle 64, has been caused to rotate in a counter-clockwise direction by means of the element 63. In this position it will be noted that the points 68 and 69 now lie on a line which is parallel to the aforesaid vertical line joining points 70 and 71. In Fig. 7 the element 63 has been moved another step to the right, thereby changing the position of the triangle 64, and the line joining points 68 and 69 is again at an angle to the vertical line through points 70 and 71, but in the opposite position to that shown in Fig. 5. In Fig. 8 the triangle 64 has been further rotated in a counter-clockwise direction so that now again, as in Fig. 6, the line joining points 68 and 69 is parallel to the vertical line through points 70 and 71. In Fig. 9 the triangle 64 has reached its extreme position and the position of the various elements is at the top of the cycle of reciprocation. It will be noted that in this position the line joining points 68 and 69 occupies the same relative position to the vertical line through points 70 and 71 as was the case in Fig. 5.

The end 11 of the cross member 4, which in these Figures is represented by the triangle 67', rests upon the supporting head 16 diagrammatically represented by 67 along the line 72. Since the relation of the line through points 68 and 69 is fixed with respect to this line 71, a change in the slope of the line through points 68 and 69 will effect a corresponding change in slope of the line 72 which results in a like change in the slope of the line 61 representing the plane of the base of the crate. The members 60 being of the same length and free to rotate about their points of connection with the crate and the cross member, the midpoint 71 of the base of the crate will reciprocate on a vertical line passing through point 70 and, regardless of the position of the various elements of the mechanism, these two points will always lie on this vertical line. By changing the relative position of the triangle 67' with respect to the element 67, variations in the amount of slope of the line 61 may be effected for equal displacements of the triangle 64. With the triangle 67' occupying the relation to the element 67, as illustrated in Fig. 5, the line 61 will pass through a series of positions for each half cycle of reciprocation, as illustrated in Fig. 10. In Fig. 10 the line 73 illustrates the position of the bottom of the crate at various intervals of the cycle, as illustrated by Figs. 5 to 9, inclusive. The relation of the triangle 67' with respect to the element 67 can be altered by means of the adjusting screw 50 or like means hereinbefore described. Any change of the triangle 67' with respect to 67 will result in a corresponding change in the position of the line 73 at various intervals of the cycle. As illustrated in Fig. 10, the position of the crate occupies eight different positions for each cycle of reciprocation, that is, the crate 5 is alternately tipped or rocked eight times during movement from the lowest position, as illustrated in the left tank of Fig. 4, to the corresponding position at the end of each cycle.

This rocking motion of the cradle, which is accomplished without any deviation of the cradle from a vertical line, materially assists in thoroughly agitating the pickling fluid as well as insuring a positive washing action over every portion of the plates to be pickled.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. The combination with a pickling tank, of a carrier in said tank, means for reciprocating said carrier in a substantially vertical path, and means for successively tipping said carrier into a plurality of oppositely inclined positions during each cycle of such reciprocation.

2. The combination with a pickling tank, of supporting heads on opposite sides of such tank, a bell crank for actuating said heads, arms pivotally attached to said heads and adapted to restrain the lateral motion thereof and to impart thereto a rocking motion, a cross head spanning such tank and supported by said supporting heads, and a carrier sup-

ported by said cross head and adapted to be actuated in said tank.

3. The combination with a pickling tank, of supporting heads movably mounted on opposite sides thereof, a cross member spanning said tank and supported on said supporting heads, means for adjusting the position of said cross member with respect to the supporting heads, means for imparting simultaneous reciprocal and rocking movements to such supporting heads, and a carrier supported by said cross member and depending therefrom into said tank.

4. The combination with a plurality of pickling tanks, of means for actuating the mechanism of one of said tanks, a carrier and a reciprocating and rocking mechanism for each tank, and a tension member connecting the mechanism of the first mentioned tank with the mechanism of another tank to actuate the mechanism of the said other tank and to counterbalance the various operative mechanisms with their associated loads of material to be operated upon.

5. The combination with two pickling tanks, of supporting heads mounted adjacent the opposite ends of such tanks, a bell crank attached to each of said supporting heads and adapted to actuate the same, arms rotatably secured at their one end to such supporting head and rotatably mounted at their other end on a rigid support, means for actuating the bell cranks of one of said tanks, and means connecting the bell cranks of the adjacent ends of the different tanks, said means adapted to counterbalance the loads on the supporting heads, cross members supported on said supporting heads and carriers supported on said cross member.

6. The combination with a pickling tank, of bell cranks mounted adjacent the ends of such tank, supporting heads rotatably secured to such bell cranks, arms rotatably secured at one end to a rigid support and movably secured at their other ends to such supporting heads, pitmans attached at one end to said bell cranks, one of said pitmans being attached to a rotary head, and means variously spaced from the axis of such rotary head and adapted to secure the ends of said pitman for various operative connections.

Signed by me, this 19th day of September, 1929.

CLARENCE L. TAYLOR.