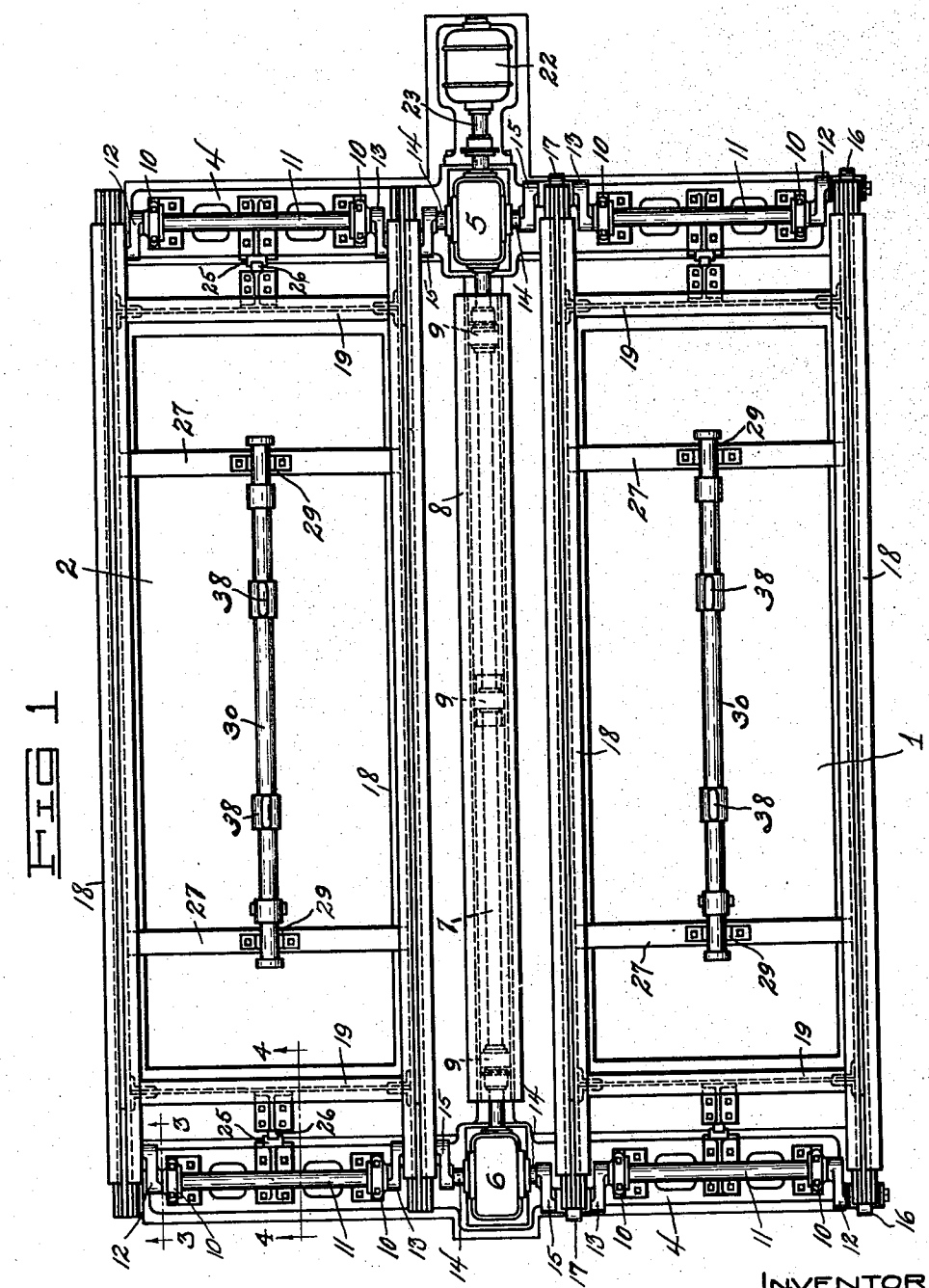
Oct. 29, 1935. S. L. WILLIAMS 2,019,206

PICKLING APPARATUS

Filed Feb. 12, 1934 3 Sheets-Sheet 1

FIG 1



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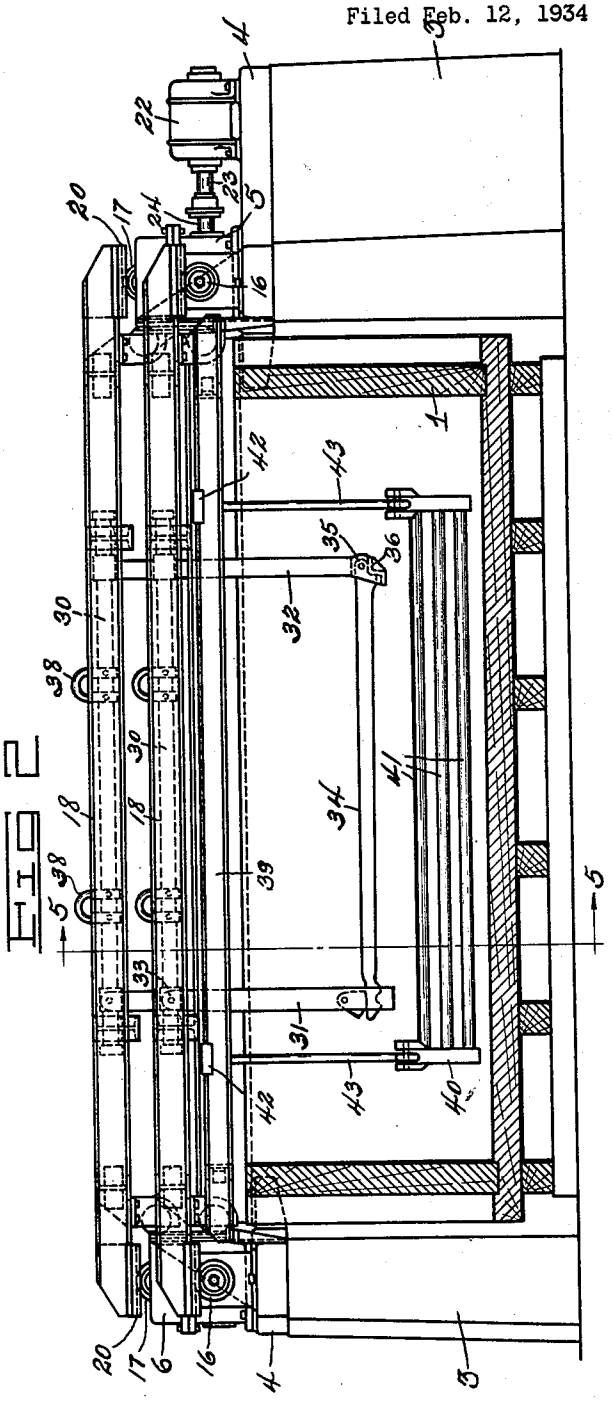


FIG 2

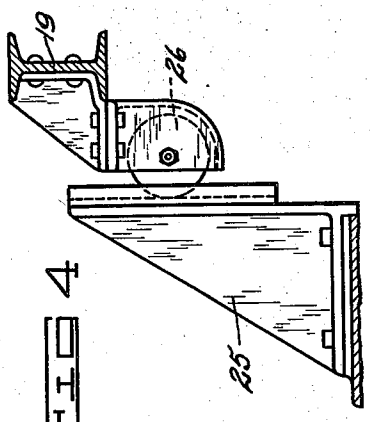


FIG 4

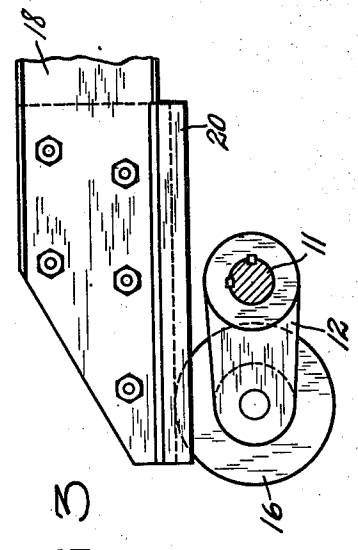


FIG 3

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PICKLING APPARATUS

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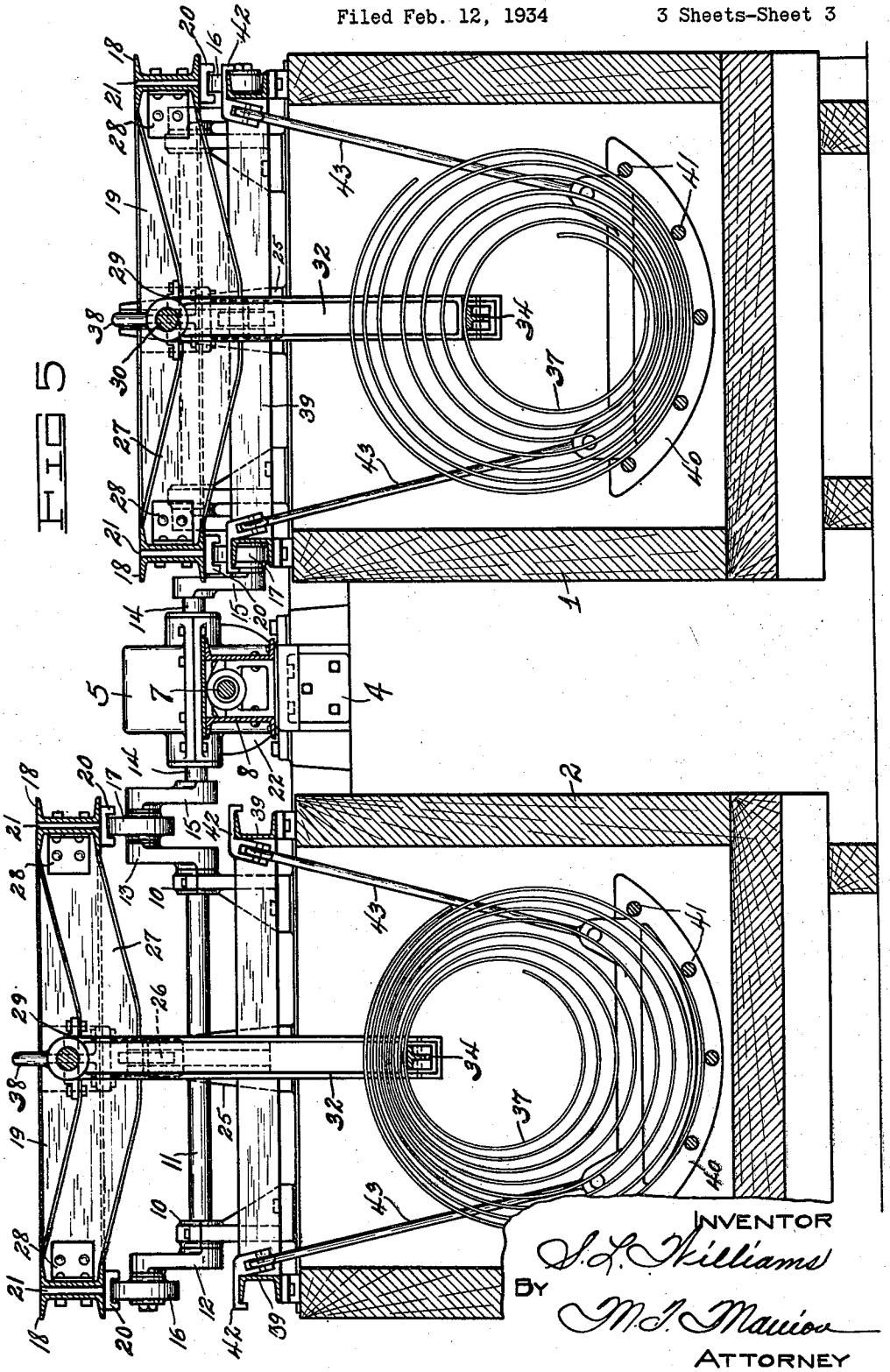


FIG 5

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UNITED STATES PATENT OFFICE

2,019,206

PICKLING APPARATUS

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Application February 12, 1934, Serial No. 710,852

4 Claims. (Cl. 266—7)

This invention relates broadly to metal pickling apparatus, and is an improvement upon my prior patent numbered 1,881,157, dated October 4, 1932.

One of the objects of the invention is to provide a pickling mechanism which is so constructed and operated that the pickling operation is effected with a minimum of power consumption.

Another object of the invention is to provide an apparatus of the character mentioned in which the simple operating mechanism is positioned directly above the pickling tanks in a position directly adjacent the tops thereof so that said mechanism extends upwardly but slightly above the level of the tanks thus lessening the chances of damage or injury to the mechanism by reason of accidental bumping, etc., as, for instance, when loading.

A still further object of the invention is to provide a pickling apparatus composed of few and simple parts not readily subject to get out of working order.

With these and other objects in view, the invention resides in the features of construction, combinations of elements, and arrangement of parts which will hereinafter be fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a top plan view of the invention;

Figure 2 is a side elevation of the same, the pickling tank being shown in vertical section;

Figure 3 is a vertical section, enlarged, on line 3—3, Fig. 1, showing in detail the positioning of the roller and crank arm in connection with a reciprocating carrier frame;

Figure 4 is a vertical section, enlarged, on line 4—4, Fig. 1, depicting in detail the roller guide mechanism for the reciprocating frame; and

Figure 5 is a section on line 5—5, Fig. 2, illustrating coiled strips in the pickling tanks and supported by the carrier.

Referring to said drawings, 1 and 2 designate companion pickling tanks of rectangular form disposed in spaced parallel relation, which tanks are designed to contain the pickling fluid or bath. Located outwardly from and in spaced relation to the opposite ends of each of the tanks are suitable foundations 3, each of said foundations being preferably made from concrete and being of a size and shape adapted to conveniently receive in fixed relation thereupon an appropriate cast metal base plate 4, which base plate 4 is designed to have rigidly fastened thereto, as by means of bolts, operating mechanism which will hereinafter be described.

Gear boxes 5 and 6 housing appropriate gearing are permanently bolted to the plate 4 intermediate the tanks 1 and 2, and connecting said gear boxes is a longitudinal drive shaft 7, said shaft 7 being disposed in parallel relation to the tanks and slightly above the latter. An appropriate housing 8 encloses said drive shaft 7 substantially throughout its entire length and, additionally, carries a plurality of bearings 9 in which the drive shaft is journaled.

A pair of bearings 10 are suitably attached to the base plate 4 at each of the opposite ends of the tanks and each pair of bearings has journaled therein a shaft 11. Each of the four shafts 11 carries on its outer end a crank arm 13. Short shafts 14 extend transversely from each of the gear boxes 5 and 6, and at right angles to the drive shaft 7, and each of the short shafts 14 carries a crank arm 15.

Each of the crank arms 12 has mounted thereon for free rotation a roller or disc 16, and interposed between the crank arms 13 and 15, and jointly supported by the latter, is a freely rotatable roller 17, similar in all respects to the rollers 16, said rollers 16 and 17 providing means by which two rectangular carrier frames are supported in overlying relation to the pickling tanks, which frames afford supports for carriers of the material to be pickled.

The supporting frames, as herein shown, are composed of parallel longitudinally extending side members, each formed of two rigidly attached channel irons 18, and transverse channel irons 19 connecting said side members at a spaced distance from their ends.

A U-shaped shoe or grooved trackway 20 is located adjacent the opposite ends of each pair of parallel side members 18 of the frame and on the under side thereof, said trackway having formed integral therewith a vertically extending shank or web portion 21, which latter is received between and bolted to the confronting faces of the companion channel irons 18, as shown in Figs. 3 and 5. By means of said trackways 20 the rectangular frames are supported over the tanks, the rollers 16 and 17 being received in underlying relation to the grooves and thus supporting the frames, as is most clearly shown in Fig. 5. Otherwise expressed, the rectangular frames are made to freely rest solely upon the rollers 16 and 17.

An electric motor 22 is mounted upon the base plate 4 rearward of and in line with the gear

box 5 and has the drive shaft 23 thereof coupled to a stub shaft 24 of the gear box. As will be understood from the drawings, operation of the motor 22 results, due to the provisions of intermediate gearing and shafting, in rotation of each of the four shafts 11, the two shafts 11 at one end of the tank being rotated in a clockwise manner, while the two shafts 11 at the opposite end of the tanks are rotated in a counterclockwise manner. Obviously, rotation of the shafts and the thereby carried crank arms and associated rollers at the opposite ends of the tanks in reverse directions results in the frames supported on said rollers 16 and 17 being vertically reciprocated with each revolution of the crank arms. Moreover, it will be noted that the two supporting frames have alternate vertical movements—that is, the frame of one tank travels in an upward direction while the frame of the other tank travels in a downward direction, and vice versa. Such alternate movements of the reciprocating frames tends to provide a balanced apparatus and results in a minimum of power consumption.

Bolted to the base plate 4 at opposite ends of each tank and in the longitudinal center thereof is an upstanding guide frame 25, each guide having in its tank-confronting face a vertical extending channel, in which channel is received for vertical travel a roller 26, said roller 26 being carried by the end channel 19, one form of attachment being illustrated in detail in Fig. 4. As above stated, a roller 26 is carried by each transverse end channel 19 and said rollers are designed for vertical movement along the channel of the guide 25 during reciprocating movements of the frame in the operation of the apparatus, this arrangement affording means for substantially non-frictional, true vertical reciprocation of the carrier frames. Furthermore, the guide mechanism described affords means for maintaining the frames rigid with respect to the operating mechanism when the loaded carrier is being placed on a frame or when being removed therefrom, as will hereinafter be explained.

Each of said reciprocating frames has located between its ends a pair of spaced parallel transverse I-beams 27 that have their opposite ends attached to the side members of the frame by means of angles 28 and rivets. A saddle-like bearing 29 is fastened to each of said transverse beams 27 at the center thereof, the saddle members being designed to serve as supports for the carriers of the material to be pickled.

Each of said carriers consists of a horizontal bar 30, the opposite ends of which rest in the depressions of the saddle member 29. The bar is provided with depending members 31 and 32, the member 31 being pivoted at 33 to the bar 30 and being of substantially U-shape. A horizontal member 34 is pivoted at 35 to the depending member 32 and has its opposite end free and formed to rest upon the closed bottom of the U-shaped member 31. The pivoted end of the member 32 is shouldered, as shown at 36, and engages a corresponding shoulder formed in the bottom of the member 34 to rigidly hold the member in position by the weight of the coiled metal strips 37, as shown in Fig. 5. Loops or eyes 38 are provided on the bar 30 for engagement with the hooks of a lifting crane.

A fixed rectangular frame 39, having longitudinal side and transverse end members formed of channels is supported stationarily directly above each tank, the frame 39 being so supported by having the opposite ends of the longitudinal side members supported from the base plates 4. In this manner, said frames occupy a position at a spaced distance above the top of the tanks.

A cradle 40 is stationarily suspended within each of the tanks 1 and 2, said cradle having spaced parallel longitudinal bars 41, which latter are disposed in the arc of a circle. Clamping brackets 42 are secured to the side members of the fixed frame 39, as shown in Fig. 5, said brackets having attached thereto the upper ends of downwardly and convergently related rods 43, which rods have their lower ends secured to the cradle 40 for suspending the latter in the tank.

In operation, it will be seen that, in order to loan the coils 37 on the carrier, said carrier is first disconnected and removed from the apparatus. Then the free end of the horizontal member 34 is raised and the pivoted member 31 is swung outwardly, or to the left of Fig. 2, which enables the coiled strips 37 to be positioned onto the member 34. In other words, the coiled strips are threaded on the member 34. After such positioning of the coils, the said member is then engaged with the member 31, as shown in Fig. 2. A lifting crane is then attached to the carrier by means of the eyes 38 and the same is carried to a position wherein its bar 30 seats in aligned saddle members 29 of the supporting frames.

With the carriers of the companion frames loaded and positioned as above described, power is applied to the operating mechanism by means of the motor 22. This power is transmitted to the shafts 11 and results in rotation of said crank arms 12, 13 and 15 in a manner hereinbefore described. Such rotation of the crank arms imparts vertical reciprocal movements to the carrier supporting frames by reason of the fact that said frames rest and receive their sole support through the medium of the rollers 16 and 17 which underlie the trackways 20. Obviously, as said rollers travel upwardly, the frame will be elevated, and vice versa. As said rollers 16 and 17 travel in their circular motion with their associated crank arms, said rollers travel horizontally backward and forward along the trackway, traveling in one direction throughout one 180° of the revolution and traveling in the opposite direction throughout the remaining 180° of the complete revolution.

The vertical reciprocating action above described will be clearly understood following study of Fig. 3 of the drawings, from which figure it will be observed that the trackways 20 are made of such length to accommodate the lifting rollers throughout their full horizontal movement in either direction.

The vertical reciprocal movements imparted to the carrier supporting frames results, of course, in similar reciprocal movements being imparted to the thereby carried loads. Consequently, the coils are alternately plunged upwardly and downwardly in the pickling fluid of the bath.

Referring particularly to Fig. 5 of the drawings, it will be seen that the limit of the downstroke of the carrier is such that the bottom portion of the coils come in contact with or are impacted against the cradle 40 and the weight of said coil is thereby transferred from the carrier to the cradle, resulting in the spreading or opening up of the convolutions of the coils of the upper portion. On the upstroke of the carrier, the bar 34 carries the entire weight of the coils, closing the convolutions of the upper portion and spreading the convolutions of the lower por-

tion by reason of their own weight. This opening and closing of the coils, illustrated in Fig. 5, enables the pickling fluid to have free and complete access to the entire surface of the coiled strips.

It will be observed that the carrier supporting frames may be removed from the apparatus merely by lifting the same with a crane inasmuch as there is complete absence of attaching means. Consequently, necessary repairs can be accomplished in a minimum of time and with a minimum of effort.

It will be understood that, while I have herein illustrated and described my invention as being intended for the purpose of pickling coiled strips or wire, the apparatus may be readily and conveniently converted so as to accommodate steel sheets, forgings, and the like. In this event, the cradle **40** is preferably removed from the tanks and any desired form of rack or basket substituted for the carrier herein referred to. For this reason, it will be understood that changes and modifications may be resorted to within the scope of the following claims.

What is claimed is—

1. In a pickling apparatus, a pickling tank, power means, means to support the power means in substantially the plane of the top of the tank, a crank shaft connected to the power means, rollers on the cranks of the shaft, a carrier, elongated friction shoes of inverted U-shape secured to and disposed at the bottom portion of the carrier and within and against which the rollers rotate and also move longitudinally of the shoes and of the carrier, and guide means at the ends of the carrier to hold same against longitudinal movement while permitting free vertical reciprocatory movement thereof, and free bodily lifting movement out of engagement with the guide means and the rollers.

2. In a pickling apparatus, a pickling tank, power means, means to support the power means in substantially the plane of the top of the tank, a crank shaft connected to the power means, rollers on the cranks of the shaft, a carrier, elongated tracks carried by and disposed at the bottom portion of the carrier and against which the rollers rotate and also move longitudinally thereof, and guide means to hold the carrier against longitudinal movement while permitting free vertical reciprocatory movement thereof, and free bodily lifting movement out of engagement with the guide means and the rollers.

3. In a pickling apparatus, a pickling tank, power means, means to support the power means, a crank shaft connected to the power means, a carrier, elongated tracks connected to the carrier and disposed at the bottom portion thereof and against which the cranks operate and move longitudinally thereof, and guide means for the carrier to hold same against longitudinal movement while permitting free reciprocatory movement thereof, the cranks and the guide means being loosely engaged with the carrier so that the latter can be freely lifted out of engagement with each.

4. In a pickling apparatus, a pickling tank, power means, a carrier, means operated by the power means to vertically reciprocate the carrier, said reciprocating means having loose engagement with the carrier whereby the latter may be freely lifted away from the reciprocating means, and guide means for holding the carrier against longitudinal movement while permitting vertical reciprocation thereof, said guide means also having loose engagement with the carrier whereby upon mere lifting movement imparted to the carrier same may be disengaged from the apparatus.

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