

March 22, 1932.

H. C. ALLMAN ET AL

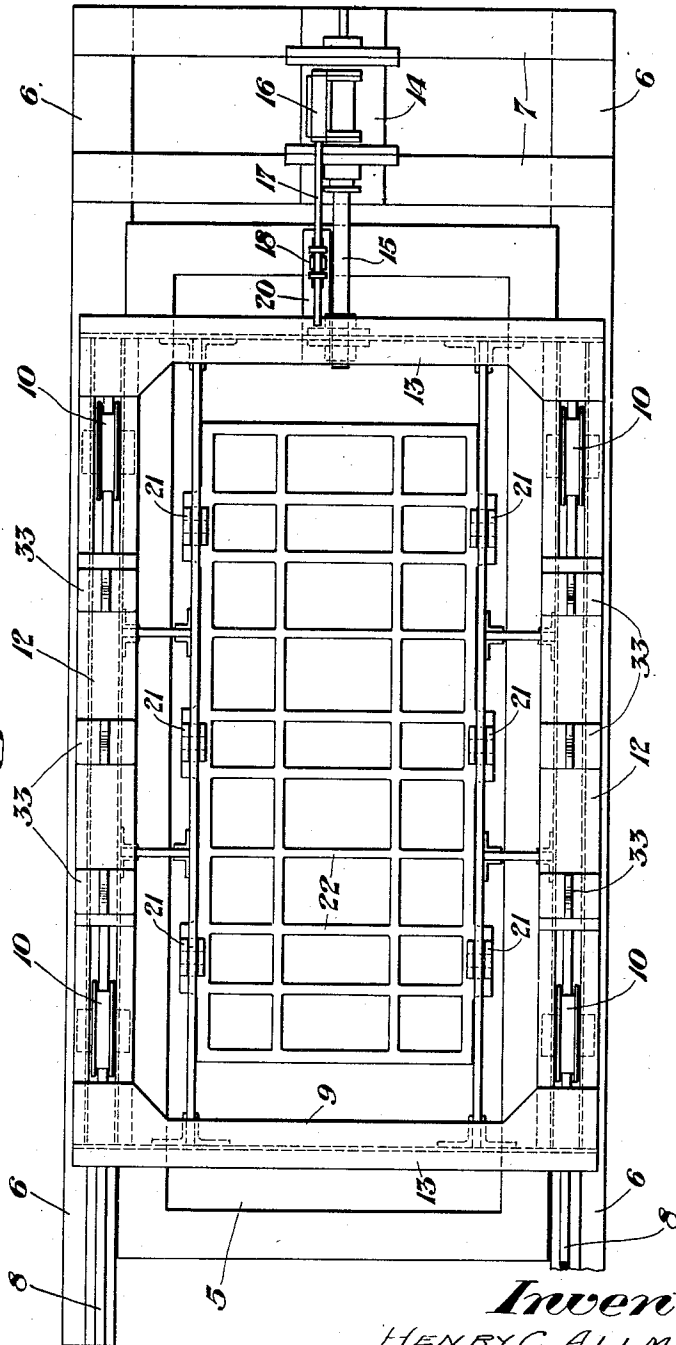
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PICKLING APPARATUS

Filed Aug. 6, 1930

3 Sheets-Sheet 1

**FIG. 1.**



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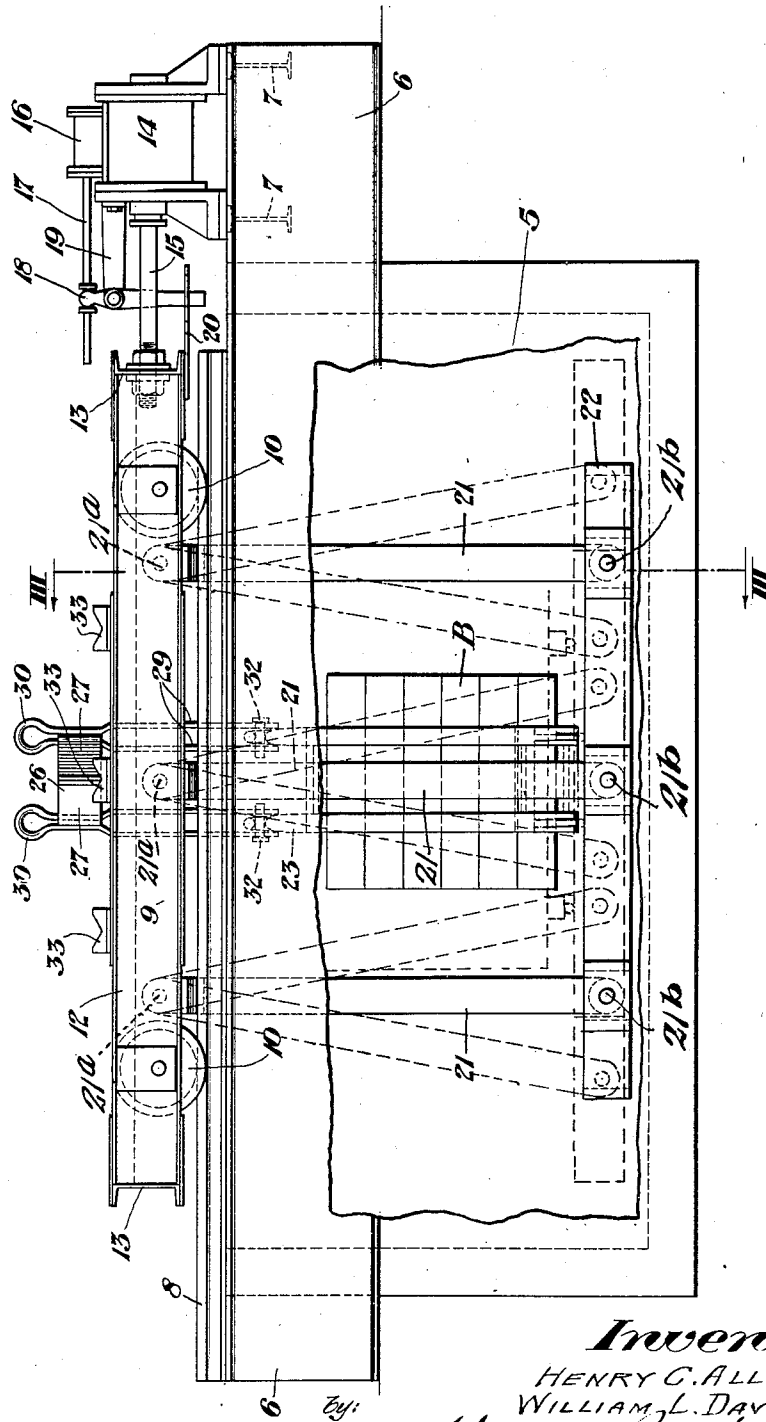
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3 Sheets-Sheet 2

Fig. 2.



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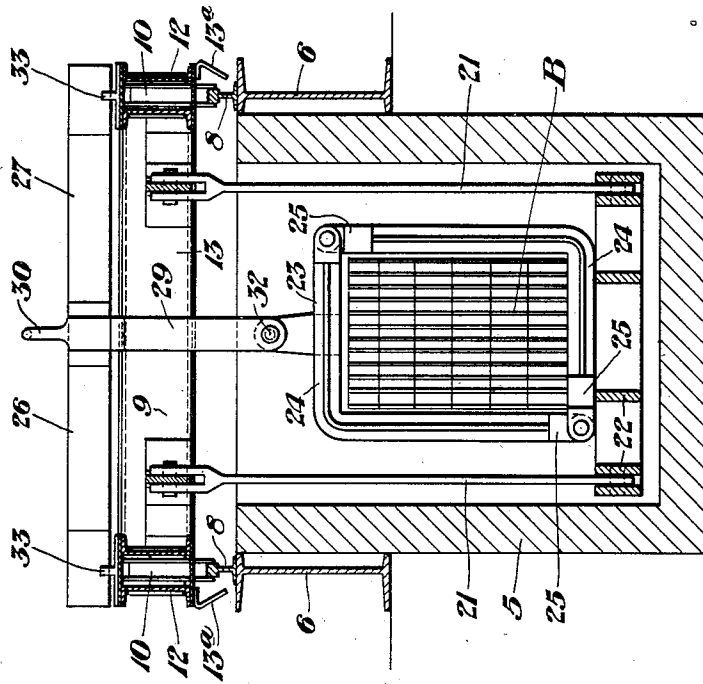
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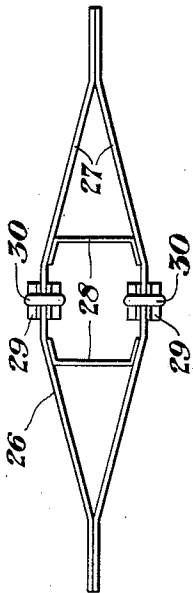
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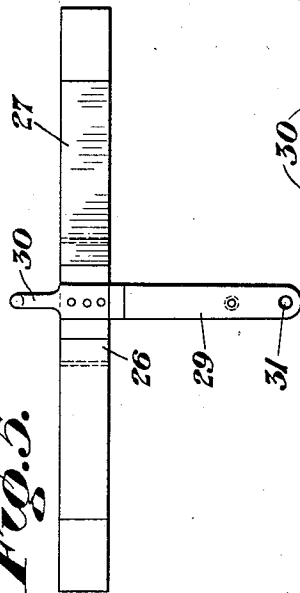
*Fig. 3.*



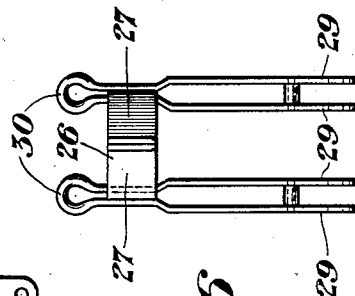
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



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# UNITED STATES PATENT OFFICE

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## PICKLING APPARATUS

Application filed August 6, 1930. Serial No. 473,464.

This invention relates broadly to pickling apparatus and more particularly to a machine for pickling metal bars, sheets and the like wherein the material to be pickled is suspended within a vat or tank containing the pickling fluid and given a reciprocatory motion to agitate the fluid about the material and accelerate the washing and scouring action.

10 In machines of this class the metal stock is generally reciprocated horizontally or carried back and forth in the vat or tank on a crate or the like, which is rigidly held or suspended from suitable supports so that the reciprocatory motion is in a straight horizontal plane. It has been found that a more violent agitation or turbulence of the pickling fluid about the material can be obtained if this reciprocating motion is varied from a straight horizontal plane. In the present machine this variation from a straight horizontal plane is obtained by permitting the crate with the material thereon to swing in an arc at the end of each stroke and not only is a more violent agitation of the fluid obtained but less power is required in the operation of the machine. Furthermore, it would be impractical to reciprocate the material with any degree of rapidity if the crate were rigidly suspended or supported as the crate and material thereon are comparatively heavy and considerable vibration would result and the power required to accelerate and retard the crate at the termination of each stroke would be considerable.

35 By permitting the crate to swing free at the end of each stroke the speed of reciprocation may be increased without excessive vibration and less power is required in the retarding and accelerating action at the termination of each stroke.

40 An object of the present invention, therefore, is to improve the efficiency of machines of this class by increasing the turbulence of the pickling fluid about the material and at the same time reducing the amount of power required to operate the machine.

45 Another object of the invention is to provide a method of suspending or supporting the crate carrying the material to be pickled

so that a minimum of parts are exposed to the action of the acid, thus reducing the amount of anti-acid metal or material required in the construction of the machine.

Among other advantages the present improved machine contemplates a particular form of driving mechanism whereby the efficiency of the machine is further increased.

Other objects and advantages resident in the improved pickling machine will become apparent in view of the specification and claims taken in conjunction with the drawings, wherein:—

Figure 1 is a plan of a pickling machine embodying the features of the invention.

Figure 2 is a view in side elevation thereof.

Figure 3 is a sectional elevation taken on the line III—III of Figure 2.

Figures 4, 5 and 6 are, respectively, views in plan, side elevation and end elevation of a preferred form of crate hanger used with the machine.

Referring to the drawings, the numeral 5 designates a pickling vat or tank which may be made of or lined with suitable material which will not be affected by the acids of the pickling fluid. This vat or tank may be disposed in a convenient position relatively to the reciprocating truck mechanism, which is supported independently of the tank on beams 6 and 7, the beams 6 providing a support for track rails 8, on which a reciprocating carriage 9 provided with flanged wheels 10 is mounted. This carriage 9 may be constructed of side beams 12 and end beams 13 of sufficient strength to support the metal undergoing the pickling operation. Safety guards 13<sup>a</sup> are provided along the tracks 8.

The preferred means for reciprocating the carriage consists of a cylinder 14, such as the ordinary pump cylinder, which is provided with a piston, not visible, to which a piston rod 15 is connected. The cylinder 14 is provided with the usual valve 16 for admitting steam or other fluid pressure to the opposite ends of the cylinder 14, said valve having a stem 17 projecting from one end of the valve casing, the stem being connected to the one end of a lever 18 pivotally mounted on a bracket 19 which is secured to the cylinder 14.

The lower extremity of the lever 18 is engaged by a trip or actuating member or rod 20 which is secured to the adjacent extremity of the carriage 9.

By means of the foregoing construction, it will be seen that the carriage is reciprocated by the cylinder and piston assembly, the reciprocatory motion of the carriage in turn actuating the valve stem 17, which automatically reverses the direction of movement of the piston rod 15 connected to the carriage 9.

A crate 22 is suspended from the carriage 9 by means of suspension links 21 which are connected to the carriage 9 and the crate 22 by pivot pins 21<sup>a</sup> and 21<sup>b</sup>, respectively. The crate 22 is preferably ribbed in the manner shown in plan in Figure 1, said links and crate being comprised of a material which is not affected by the acids of the pickling solution.

The material to be pickled may be placed directly on the crate 22 or may be stacked in a cradle or crate 23, see Fig. 3, said cradle as shown comprising L-shaped clamps 24 connected by brackets 25. The cradle 23 is suspended in the pickling tank by means of hangers generally indicated at 26 and preferably comprising sheet bars 27 which are riveted together at opposite extremities and spaced centrally by reinforcing bars 28. On each bar 27 hanger brackets or yokes 29 are secured, said brackets being bent to form eyes 30 at their upper extremities to receive crane hooks, and forked and formed with holes 31 at their lower extremities, the crate or crates 23 being suspended from these hangers 29 by means of pins 32, note Fig. 2. When placed in position on the truck 9, the opposite extremities of the hangers 29 rest on saddles 33 mounted on the side beams 12, a plurality of pairs of saddles being provided to accommodate a plurality of cradles 23.

In the instance shown, the material to be pickled comprises slabs of metal B which are held in stacked relation in the crate or cradle 23 and the latter suspended in the tank by means of the hanger 26. The cradles 23 may, however, be placed directly on the crate 22 and serve principally as a convenient loading means.

The operation of the apparatus is readily apparent. The crate 22 or cradle 23 may be supplied with the material to be pickled and suspended from the carriage 9 in the tank or vat 5, and the carriage reciprocated by the cylinder 14 to facilitate the pickling operation.

With the herein described method of suspending the material in the tank, the crate or cradle is permitted to swing free, so that at the end of each stroke, the crate swings in an arc somewhat further than the actual travel of the carriage, as indicated in dotted lines in Figure 2, the amount of swing depending on the speed at which the truck or

carriage is reciprocated. This swinging motion or overtravel of the crate or cradle creates a comparatively violent agitation of the pickling fluid with the truck or carriage operating at a minimum speed, and also cushions the shocks due to reversal of motion and reduces the peak load or power required in accelerating and retarding the loaded crates.

It will also be noted that with this method of suspension, only the crates and material thereon are exposed to the pickling fluid. Thus the principal working parts of the machine are not exposed to the action of the acids in the pickling fluid and do not require anti-acid metal in their construction and maintenance.

Another advantage is that the truck and reciprocating mechanism are supported entirely separate from the tank 5, so that the latter is relieved of any part of the weight of the machine and material being pickled. Also, the truck and cylinder both being mounted on the same frame, there is no tendency toward misalignment of these parts.

An advantage of the cylinder 14 lies in the gradual acceleration and retardation of the carriage during reciprocation thereof, the start of each stroke being comparatively slow, gradually increasing in speed to nearly the end of the stroke, when steam is admitted to the opposite end of the cylinder, whereupon a comparatively sudden but well cushioned stop and reversal of movement of the carriage ensues, the crate at this time swinging beyond the actual travel of the carriage and causing a surge of the pickling fluid about the material undergoing the pickling operation, with the advantages hereinbefore specified.

It will be obvious, however, that apparatus other than a cylinder may be used for propelling the apparatus. For example, the rod 15 may be connected to the pin of a crank-arm on a crank-shaft and the crank-shaft may be driven by an electric motor or the like.

What is claimed as new is:

1. Pickling apparatus comprising a tank, trackways mounted at opposite sides of said tank, a carriage mounted for travel on said trackways, a crate swingably suspended from said carriage for movement relative thereto in the direction of travel of the carriage, and means for imparting a gradually accelerated and retarded reciprocatory motion to the carriage.

2. Pickling apparatus comprising a tank, trackways mounted at opposite sides of said tank, a carriage mounted for travel on said trackways, a crate suspended from said carriage so as to swing relatively thereto in the direction of travel of the carriage, a fluid-actuated carriage reciprocating means mounted in operative alignment with the carriage, and a valve operable by said carriage

for controlling the flow of fluid to said fluid actuated carriage reciprocating means.

3. Pickling apparatus comprising a tank, trackways mounted at opposite sides of but separately from said tank, a wheeled carriage mounted on said trackways, means for imparting a gradually accelerated and retarded reciprocatory motion to said carriage, and a crate suspended from said carriage and adapted to swing relatively thereto at each reciprocation thereof to increase the turbulence of the pickling fluid about the material being pickled.

In testimony whereof, we have hereunto set our hands.

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WILLIAM LEROY DAVIS.

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