

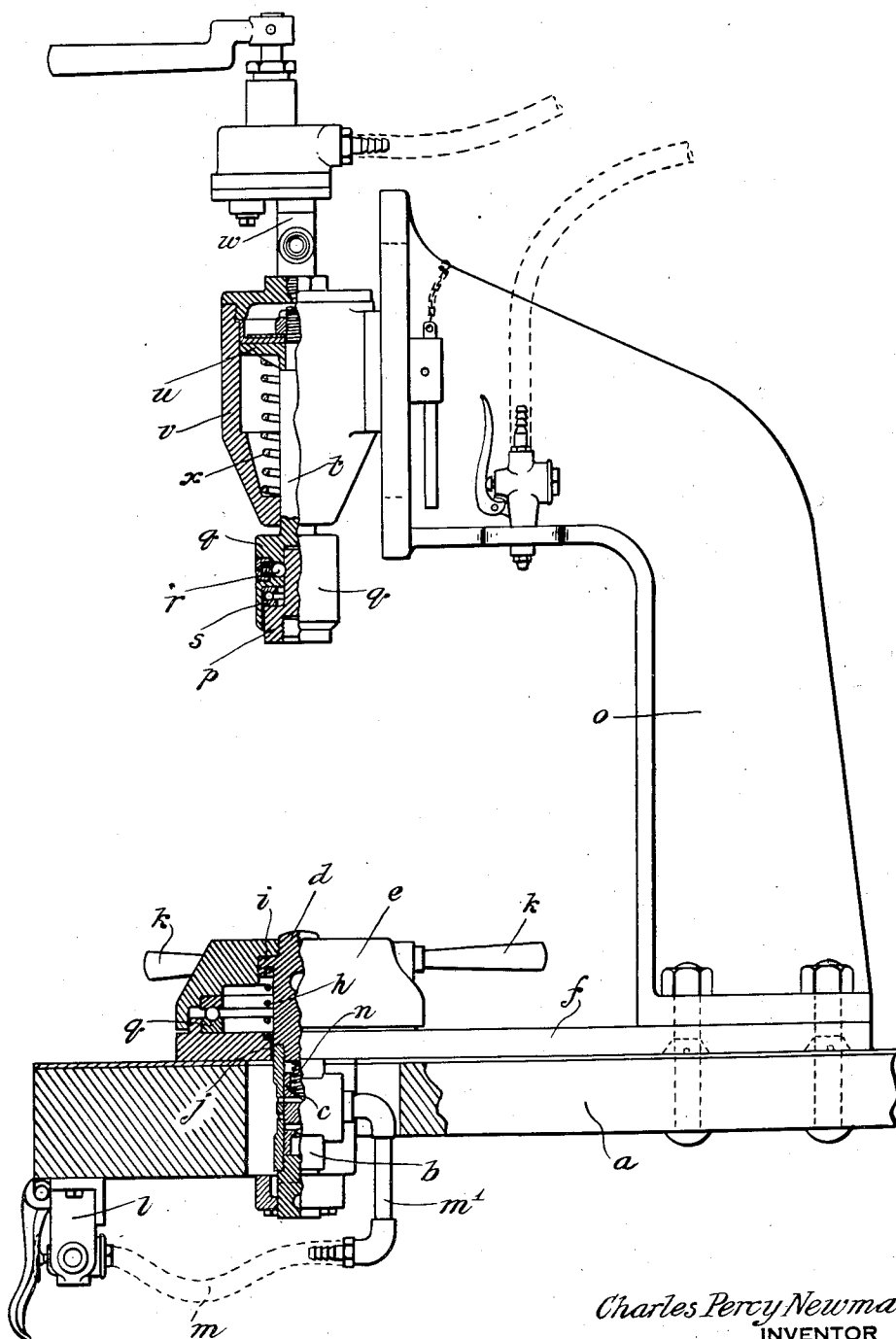
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CORE LOOSENER

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CORE LOOSENER

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This invention relates to a method and apparatus for loosening cores from core boxes, and has for an object to provide improvements therein.

Hitherto it has been usual, in order to release the sand core, to hammer the box either with a metal, raw hide, rubber composition or wooden hammer or mallet. This hammering causes serious damage to the boxes and the life of the boxes is shortened far more by such hammering than by any wear they may get during the performance of their normal function, that is, the formation of the sand core. The damage caused by hammering takes two forms, namely, (a) in the case of a metal box bruising or actually breaking the box, and in the case of a wooden box splintering and generally disintegrating the box, and (b) the rapping of the hammer does not take place always in an absolutely vertical direction, so that it is apt to shake the dowels and sockets of the box, causing a side play which produces lapped cores.

In the production of sand cores in core boxes according to the present invention, the cores are loosened from the core boxes by clamping the box between suitably arranged clamping members and vibrating the box while thus held between the clamping members by delivering rapidly succeeding shocks thereto.

The box may be filled with sand prior to clamping it in position and the clamping pressure may be utilized to assist in the formation of the core. The formation of the core may be completed by ramming the sand in the box by means of a tool inserted through one or more apertures provided therefor in the core box.

Apparatus for carrying out the present invention may comprise opposed clamping members between which the core box is adapted to be clamped and vibrated. One of the said clamping members may be movable and power operated. Again, one of the clamping members may be provided with means to act on the box to vibrate the same for the purpose of loosening the core. One of the said clamping members may constitute a housing for the vibrating member.

The clamping members may be rotatably mounted so that the box held between the clamping members can be rotated while clamped in position.

A core box for use with the present invention may be made in two or more parts and may be provided with one or more apertures in the side wall through which a tool may be introduced for the purpose of ramming the sand.

This application is a continuation in part of

my copending application Serial No. 608,218, filed April 29, 1932.

The invention will be illustrated by way of example with reference to the accompanying drawing which is an elevation, partly in section, of one construction of apparatus according to the invention.

Referring to the drawing the vibrating mechanism is carried on a horizontal support *a*, and consists of a cylinder *b*, piston *c*, and vibrating member *d*, the top of which normally projects slightly above a table or housing *e* constituting one clamping member, which rests on a plate *f* bolted to the support *a*. The housing *e* accommodates a ball thrust bearing *g* arranged concentrically around the member *d*. A coil spring surrounds the member *d* between abutments formed respectively by a flange *i* on the member *d* and a recess *j* in the plate *f*. The housing *e* can be rotated on bearing *g* by handles *k*, *k* fitting into recesses in the housing *e*. The admission of live air into the cylinder *b* is controlled by a knee-operated valve *l* connected by piping *m*, *m* with the cylinder *b*. A spring *n* is disposed between the member *d* and piston *c* and is located in position by bosses formed on these members. The function of the spring *h* is to hold the member *d* up to the work, and the function of the spring *n* is to return the piston to starting position after each upward stroke.

A standard *o* bolted to the support *a* supports, vertically above the member *d*, a holding member *p*, constituting a second clamping member. The member *p* is held in a box *q* by a spring pressed ball *r* which engages in a recess in the shank of the member *p*. A ball thrust bearing *s* is provided between the member *p* and an abutment formed in the box *q*. The box *q* is connected by a rod *t* to a piston *u* working in cylinder *v*, in which it is displaced downwardly by live air admitted to the cylinder *v* through a valve controlled inlet *w*. The return stroke of the piston *u* is effected by a spring *x* surrounding the rod *t* and acting on abutments formed by the under side of the piston and the bottom of the cylinder.

In use a quantity of sand (rather more than is actually needed to fill the core box loosely), is filled into the two parts of the core box, so that the level of the sand is above the top of the box parts. The two parts are then assembled in correct relationship on the housing *e*, the spring *h* serving to hold the member *d* against the bottom of the box. Live air is now admitted to the cylinder *v* so that the member *p* is forced down on to the top of the box and the latter is clamped firmly

between the member *p* and the housing *e*. The forcing of the member *p* on to the top of the core box also serves the functioning of closing the parts of the box with sufficient pressure to compress the sand in the box, thereby assisting formation of the core. Further compression of the sand in the box is effected manually by the operator by rotating the housing *e* by the handles *k*, packing the sand by means of a pestle which is consecutively inserted through the apertures provided in the box. When the core has thus been completely formed, live air is admitted through the valve *l* (actuated by the operator's knee) into the cylinder *b*, thereby actuating the piston *c* and the vibrator *d*, the latter vibrating the core box. After each stroke the piston *c* is returned by the spring *n*. In this way the core is rapidly loosened. It will be noticed that vertical blows are transmitted by the member *d* which prevents serious damage to the box. When the formed core is loosened, the member *p* is raised, the core box is removed and the top part removed by hand. The core can easily be taken out of the other half of the core box as it is rigid enough to be handled. It will be evident that since the upper clamping member *p* is movable in a vertical plane, the apparatus will be adjustable for height of the core box.

The member *p* shown on the drawing is circular in section. In the case of large boxes or those of irregular shape it may be advisable to attach to this base member a head or holder of special irregular formation, so as to bring the pressure for holding the box on to the points desired to ensure a firm grip. For small and regularly shaped boxes the circular member is satisfactory, but in the case of a box with, for example, a horizontal arm extending for some distance, it might be advisable to bring pressure to bear on the end of the arm to prevent any spring which would be inclined to open the box at this point.

In lieu of the overhead clamping means above described, an air-operated press may be used in which the piston rod is connected to an overhead cross-arm fulcrumed intermediate of its ends, the other end of the said cross-arms operating the press.

The invention is not limited to the form of apparatus described in the drawing. For example, electrical means may be employed for actuating the reciprocating member. Thus, the reciprocations may be obtained by rapidly energizing and deenergizing a solenoid, thereby causing the iron core to reciprocate in the coil.

What is claimed is:

1. The method of loosening cores from core

boxes consisting in firmly holding the box against vibration and delivering rapid blows to the box itself over a relatively small area as compared to its total surface area and within the firmly held area of the box.

2. The method of loosening cores from core boxes consisting in firmly holding the box between surfaces of substantially the same shape and area as the box, and delivering to the box itself rapid blows at a point within the boundaries of one of the holding surfaces and over a relatively small area as compared to the holding surface.

3. A device for loosening the cores from core boxes comprising two holding surfaces for the box, means for clamping a core box between said surfaces, a member within an opening in one of said surfaces in alignment with the core and projecting beyond said surface, and means for delivering rapid blows to said member to deliver direct shocks to the box.

4. A device for loosening cores from core boxes comprising an upper and a lower box holding surface, power means to press the upper surface downward against the core box to clamp it, resilient means for pressing the upper surface upward, a plunger projecting above the lower surface, resilient means for holding said plunger upward, and power means for delivering blows to said plunger and thus to the core box held between the upper and lower surfaces.

5. A device for loosening cores from core boxes comprising a clamp having an upper and a lower holding surface, means for rotating said surfaces, a rod carrying the upper surface, a cylinder above the upper surface, a piston within said cylinder, a connection between said piston and said rod, a valve for admitting a fluid into said cylinder to actuate said piston for pressing through the agency of said rod the upper surface against the core box, a spring around said rod opposed to pressure by said piston, a plunger projecting through an opening in the lower surface into contact with the core box, a spring for pressing the plunger upward, a cylinder below the lower surface, a piston in said last mentioned cylinder, a spring between said plunger and said last mentioned piston tending to separate the two, and a valve for admitting a fluid into said last mentioned cylinder to force said last mentioned piston against said plunger and thus to deliver a blow to the core box itself.

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