



SECTION IX Nos. 129—144

Clock and watch escapements, power stamps and hammers, power punch, rotary conveyer, blower, pile driver and miscellaneous devices.

## Section IX

**129.** Clock escapement. An escapement is a combination in which a toothed wheel acts upon two distinct pieces or pallets attached to a reciprocating frame. The frame is so arranged that when one tooth escapes or ceases to drive its pallet, another tooth shall begin its action on another pallet. The object of an escapement in a clock or watch is to stop and then set in motion again, at regular intervals, every wheel in the entire train of mechanisms. This action causes the familiar tick of a clock and watch. The rotating toothed wheel is the driver and gives a swinging or oscillating motion to the driven member. This type of escapement was used on the first clock movements when whole works were made of wood.

**130.** Clock escapement. In this model, the arm which holds the pallets is guided by a pin fastened to the red disk. The wheel is kept from escaping or making a continuous rotary movement, by the alternate action of the pallets entering and retiring from between the teeth of the escape wheel.

**131.** Clock escapement. The Seth Thomas clock exhibit opposite this section makes use of a type of clock escapement very similar to this, the only difference being a slight change in the shape of the pallets. The escape wheel, which turns in a clockwise direction, is supplied with long, pointed teeth. As it turns, the pallets alternately come in contact with the teeth, and cause the pendulum to swing.

**132.** Watch escapement. The escapement in watches operates on the same principle as that in clocks, though a balance wheel is used instead of a pendulum. The anchor shaped piece with two horns is called the pallet. First one horn of the pallet, then the other, locks with the teeth of the escape wheel as it revolves. The unlocking is accomplished by a lever attached to the pallet. The action of this lever is controlled by a balance wheel which gets its action from the coiled spring often called a "hair spring." The lever is alternately engaged and released with the balance wheel by means of the small pin. Not only ingenuity, but the greatest accuracy and delicacy is required of the machinery used in the art of watchmaking.

**133.** Four-way expanding movement. When motion is given to any one of the arms, the remaining three move the same distance.

**134.** Stop wind. As the disk carrying ratchet teeth revolves, the pin attached to it carries the upper disk forward the distance of one tooth. After the last tooth is advanced, the pin rests against the outer edge of red disk and is held in that position against rotation. Flyback of red wheel represents running down of spring. This movement is used in watches to prevent over winding the spring which causes breakage.

**135.**

**136.** Baling press. This hand press is used for pressing cotton, waste paper and other material into a baling form to be tied for handling. The motion given through the hand crank is trans-

mitted to the press by means of the toothed sector and rod connected with it at a greatly multiplied power.

**137.** Gravity trip hammer. The hammer is lifted by the revolution of the toothed cam, four times to each revolution. Force of blow depends upon weight and length of drop of hammer head. This is one of the first types of power-driven forging hammers.

**138.** Gravity drop ore stamps. In the left hand model, sharp falls of the vertical rod are derived from the mutilated rotating wheel or pinion. This pinion acts upon the teeth in the rod and raises it until all teeth have meshed; then the rod falls.

In the other model, the rod is raised by the action of the revolving cam against the green lift collar. These are used for crushing rock to extract the ore and are generally mounted in gangs, having a large number in line.

**139.** Typewriter key bar. When key bar is struck by operator, the type bar is raised quickly by the connecting rod, striking the platen or roller and making the impression upon the paper through the typewriter ribbon which is held in front of platen. Recovery to original position is made by action of a tension spring.

**140.** Air hammer. The head of this hammer is attached to a piston A, and is made to work in cylinder B, by the intermittent releasing of compressed air into the cylinder above and below by the slide-valve on top. The air is supplied from the air pressure chamber into which

it has been forced by the air pump. When pump piston C is in up position, air enters through D and is compressed as piston descends through valve in bottom of cylinder. The air pump is driven by a crank attached to the black revolving disk on driving shaft. This type hammer is used for heavy duty forging and can also be operated by steam pressure.

**141.** Fan blower. This is the well known type of fan blower used for forced air draught on ventilating systems. By the revolution of the central shaft and attached fan blades, air is drawn in at the center of the casing through the inlet and forced out under pressure through the spout.

**142.** Pile driver. The earliest form of pile driver. The driver head is lifted by hooks to a sufficient height. Then the hooks are released by pressure of hook arms against the sides of the slot in the top of the frame, releasing the driver head. Its driving power depends on the weight of the driver and the height of drop since the force accumulates as the driver falls.

**143.** Rotary conveyor. A spiral blade is attached to the driving shaft so that as it rotates, the material being conveyed is pushed forward by the face of the blade in the direction of the arrow.

**144.** Toggle punch. The hand lever working upon the joint or horizontal connecting link through short center leverage at the end of handle exerts a terrific power on punch through toggle action, as explained in No. 92.