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IMPROVED CARD PRESS.

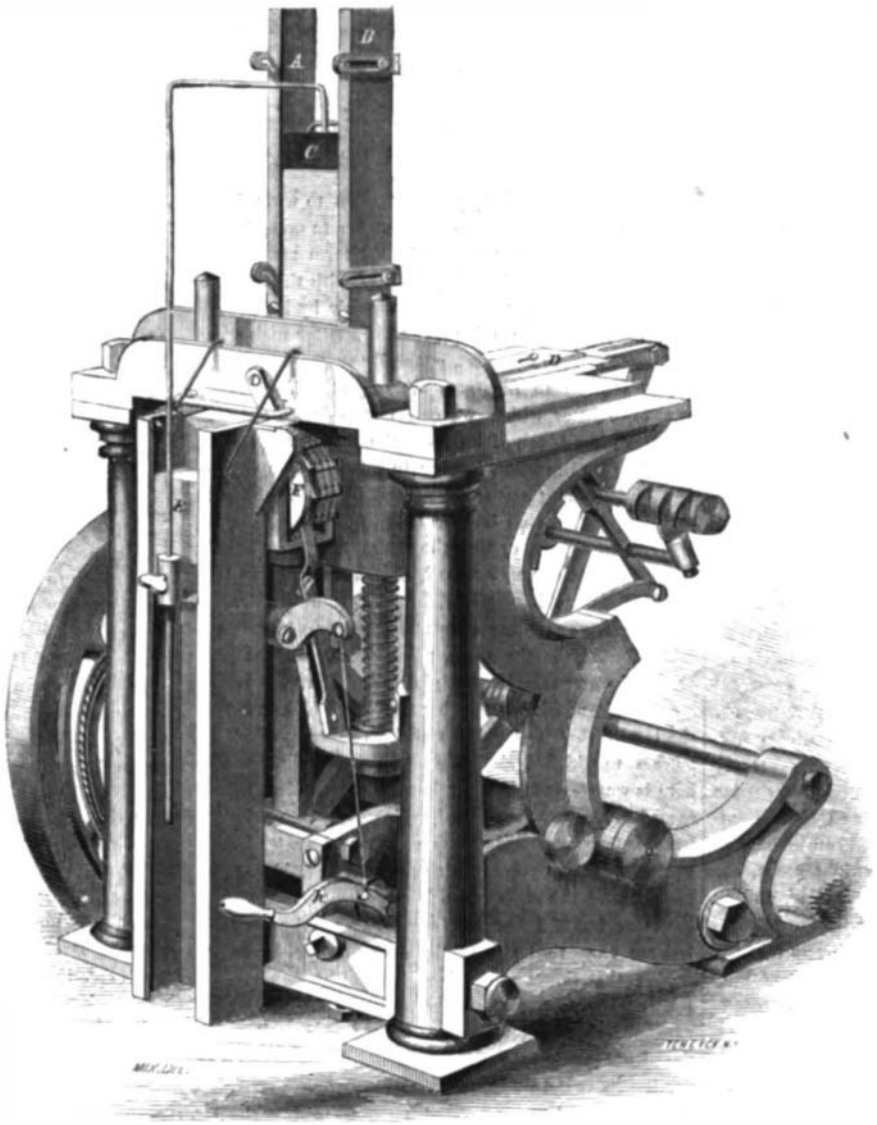
The accompanying engraving represents a press for printing cards, invented by William W. Clarkson, of Baltimore, which feeds the cards to the press automatically, and numbers them as they are printed, or not, at the will of the operator, thus being particularly adapted for printing railroad tickets.

The cards, readily prepared, are placed between the two standards, A and B, and are pressed down by the weight, C. The plate, D, slides back and forth between two guides which have grooves in their edges to admit the edges of the plate, and as the plate is drawn back, the lower card of the pile falls upon supports in the same plane with the guiding grooves. The forward end of the plate is grooved, to receive the edge of the card, and as it moves forward, it pushes the card before it, with the ends of the card between the guiding grooves, into a position directly over the form of type. By the same motion of the machinery, the inking roller is passed over the type, and as the plate and roller return to their places, the form of type is carried up against the lower side of the card, effecting the impression. As each card is carried into place by the plate, D, it pushes before it two of the cards previously printed, one of which falls on the top of the descending pile, E, which is supported by a rod fastened to the weight, C, so that the two piles of cards are lowered equally, and the top of the pile, E, always remains at the same level.

The numbering wheels, F, are of the well known plan; several disks, each with the nine digits and a cypher upon its periphery, are so connected together that the revolution of one shall turn its next neighbor one notch, while the right-hand disk is turned one notch for each card. A pawl, *g*, is so placed as to turn the numbering wheel one notch on each descent of the form. By turning the lever, *h*, the numbering wheel is so lowered as to be out of reach of the inking roller, preventing its being carried up against the card, thus throwing the numbering apparatus out of gear.

The several motions in this machine are all effected by means of two cams, or rather, by means of two grooves in the face of one wheel, and the motions are not only absolutely positive, but are very smooth, and the machine works in the most perfect and admirable manner. A manufacturer of card-printing presses, and withal a practical printer and inventor of no ordinary ability, critically examined the press from which the annexed engraving was taken, in our office, and he pronounced it, without hesitation, an excellent press.

The patent for this invention was granted on the 27th of April, 1860, and further information in relation to it may be obtained by addressing Jos. Clarkson & Son, 75 North Front-street, Baltimore, Md.



CLARKSON'S IMPROVED CARD PRESS.

THE MECHANICAL THEORY OF HEAT.

The mechanical theory of heat is simply this. All gases and vapors are supposed to consist of numerous small atoms, moving or vibrating in all directions with great rapidity, pressure being produced by these atoms striking against the sides of the vessel containing the gas. The greater the number of these atoms, or the greater their aggregate weight, in a given space, and the higher the velocity, the greater is the pressure. An increase or decrease of temperature is simply an increase or decrease of molecular motion. In other words, heating a gas, by friction or any other means, is simply increasing the velocity of the atoms in their constant vibrations.

When a gas is confined in a cylinder under a piston, so long as no motion is given to the piston, the atoms, in striking, will rebound from the piston, after impact, with the same velocity with which they approached it, and no motion will be lost by the atoms. But when the piston yields to the pressure, the atoms will not rebound from it with the same velocity with which they strike, but will return, after each succeeding blow, with a velocity continually decreasing as the piston continues to recede, and the length of the vibrations will be diminished. The motion gained by the piston will, it is obvious, be precisely equivalent to the energy, heat, or molecular motion lost by the atoms of the gas. Vibratory motion or heat being converted into its equivalent of onward motion, or dynamical effect, the conversion of heat into power, or of power into heat, is thus simply a transference of motion; and it would be as reasonable to expect one billiard-ball to strike and give motion to another without losing any of its own motion, as to suppose that the piston of a steam engine can be set in motion without a corresponding quantity of energy being lost by some other body.

In expanding air spontaneously to a double volume, delivering it, say, into a vacuous space, it has been proved repeatedly that the air does not fall appreciably in temperature, no external work being performed; but, on the contrary, if the air at a temperature, say, of 230° Fah., be expanded under pressure or resistance, as against the piston of a cylinder, giving motion to it, raising a weight, or otherwise doing work by giving motion to some other body, the temperature will fall nearly 170° when the volume is doubled; that is, from 230° to about 60°, and, taking the initial pressure of 40 pounds, the final pressure would be 15 pounds per square inch.

When a pound weight of air, in expanding at any temperature or pressure, raises 130 pounds one foot high, it loses one degree in temperature; in other words this pound of air would lose as much molecular energy as would equal the energy acquired by a weight of one pound falling through a hight of 130 feet. It must, however, be remarked that but a small portion of this work, 130 foot-pounds, can be had as available work, as the heat which disappears does not depend on the amount of work or duty realized, but upon the total of the opposing forces, including all resistance from any external source whatever. When air is compressed, the atmosphere decends and follows the piston, assisting in the operation with its whole weight; and when the air is expanded, the motion of the piston is, on the contrary, opposed by the whole weight of the atmosphere, which is again elevated. Although, therefore, in expanding air, the heat which disappears is in proportion to the total opposing force, it is much in excess of what can be rendered available; and commonly, where air is compressed, the heat generated is much greater than that which is due to the work which is required to be expended, the weight of the atmosphere assisting in the operation.

It is now thought that nitrogen is an essential element of steel.