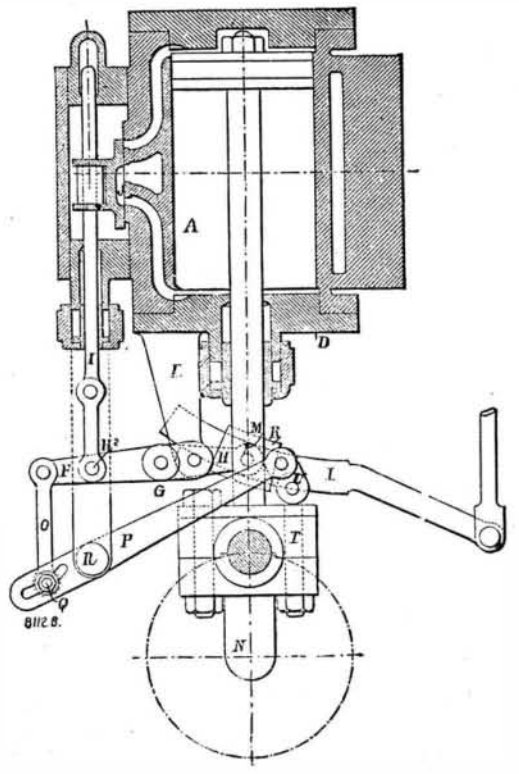
VALVE GEAR FOR OSCILLATING ENGINES.

We illustrate a novel and ingenious valve gear for oscillating engines devised by John William Hartley, of California Works, Stoke-on-Trent, England, and given in *Engineering*, from which we take the following:

This gear does away with the necessity for the use of eccentrics and permits of the expansion being varied at will up to the latest point of cut-off for which the engine is designed. We give two engravings, one showing the gear in perspective applied to an engine with the crankshaft above the cylinder, and the other illustrating an engine of the inverted type. The arrangements are practically identical, but some of the parts are more clearly shown in one view, and some in the other. The same letters of reference appear in both engravings. The cylinder, A, rocks on trunnions, B. On its upper cover it carries a bracket, E, which serves as a fulcrum for a lever, F. In this lever there is a boss, through which there passes a pin, G, forming a portion of a double-armed lever, H H, which at one end is connected to the valve spindle and at the other to a slipper block, K, sliding on a curved bar or link, L. This link is pivoted to the framing at its center by a stud, M, which is on a line drawn through the center of the crankshaft and the center of the trunnion. It can be moved and set to various positions about this stud by a reversing lever and quadrant, not shown in the engravings.

The curvature of the link is struck from the center of the trunnion, and when the link is in mid-position the slipper moves backward and forward on it without any vertical motion, and consequently there is no movement of the valve. If the link be tilted either way, the lever, F, is made to oscillate on its fulcrum, G, as the cylinder rocks, and the valve is moved to and fro, admitting steam to drive the engine backward or forward, according to the position of the link. The motion of the valve is reversed when the cylinder attains its maximum swing in either direction, and hence it follows that the mechanism we have already described, and which by itself is not novel, is not able to give either lap or lead. To enable the steam to be used expansively, a second motion is imparted to the valve from the piston rod. The outer end of the lever, F, is connected by a link, O, to a lever, P, carried by a bracket, R, attached to the cylinder. The further end of the lever, P, is coupled by a link, U, to the crosshead of the piston rod, and follows its motion. When the



piston descends, the lever, F, rises, carrying up with it the pin, G, and forcing the lever, H H, to oscillate about the center of the slipper, K, and to raise the valve. The levers, P, F, and H, are so proportioned as to give the slide valve an amount of travel at each stroke of the engine equal to the sum of the lap and lead, and this is a constant quantity independent of the position of the curved bar or link, L. By varying the position of the curved bar, the total travel of the valve can be changed as desired. The slot in the end of the lever, P, permits of the slack caused by the wear of pins being taken up.

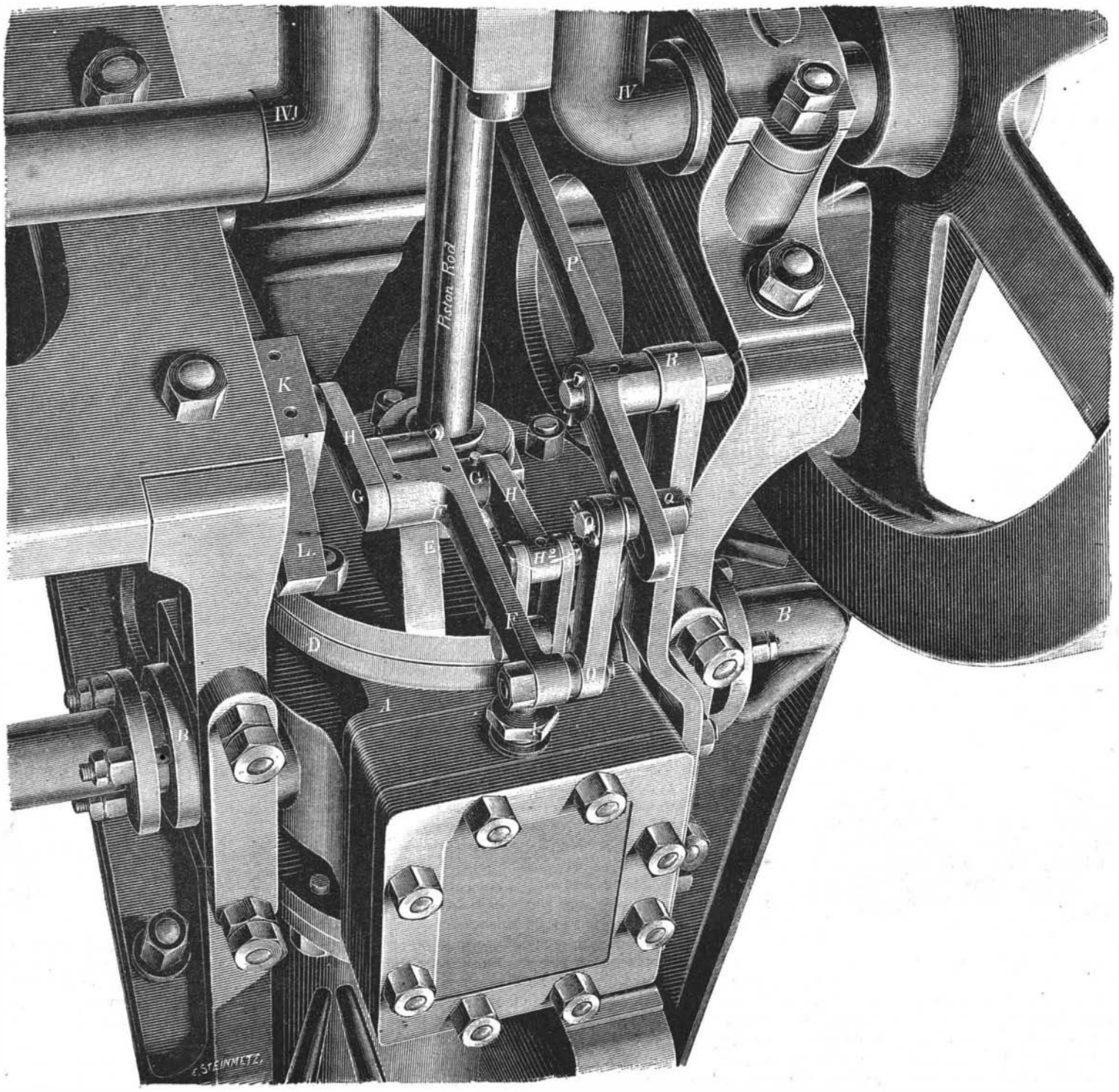
Driving a Spike under Water.

In mill work, especially when making repairs, it is often necessary to drive large spikes in water to the depth of two, three, and even four feet. Starting a spike by hand, and then attempting to drive it by means of a crowbar, is an unmechanical proceeding, to say the least. The *Manufacturers' Gazette* says one of the neatest and also the best ways of effecting the desired object is to get a piece of steam pipe of sufficient size to permit the spike to drop easily through it. Place one end of this pipe upon the spot where the spike is to be driven, drop the spike into the pipe, point first, and then follow it with an iron rod just large enough to slide easily in the pipe. By using the iron rod as a battering ram, or like a churn drill, the spike can be easily and quickly driven home without spattering the person with mud and water.

An improvement on this spike-driving rig may be made by getting a cast iron ball of two, four, or six pounds weight, drilling a hole through the ball sufficient to receive the iron rod, also drilling another hole to receive a set screw. By screwing the set screw down upon the rod, the ball can be held in any desired position. This ball gives extra weight to the driving rod, and, in fact, forms a kind of hammer whereby the spike can be more quickly driven home. It will not work well if you try to drive the spike by means of the rod and a sledge hammer. It is better, by all means, to rig up the ball above mentioned, which will do the work well and quickly.

Radiations from Melting Platinum and Silver.

M. J. Violle has studied these radiations by means of a thermopile, one surface of which received the radiations and the other was exposed to a known source of heat in such a manner as to bring the needle of the galvanometer to zero. It was found that the total radiation of melting platinum is fifty-four times that of melting silver.—*Comptes Rendus; Amer. Jour.*



IMPROVED VARIABLE EXPANSION GEAR.