## HEAT IN CYLINDER WALLS.

THERE was made recently at Sibley College an interesting study of the loss of heat from the cylinder walls of an engine during each stroke. The object was to determine the varying temperature of the cylinder head during the stroke. Steam on entering the cylinder warms up the surfaces and a certain amount of heat is stored in the cylinder walls; when the exhaust opens the temperature falls and heat flows from the walls and is lost. To determine this, experiments were made with a 10 h. p. slide-valve engine, cutting off at about half stroke. The plan of investigation was as follows: A wire of small cross-section and high electrical resistance was placed on the inner face of the cylinder head, and connected in multiple with a constant current supply and a delicate galvanometer. As the temperature varies with each cycle of the engine, the electrical resistance of the wire rises and falls with it, the amount of current flowing being altered, and a corresponding deflection being thus obtained in the galvanometer. To preserve a permanent record of these pulsations, the galvanometer was of the mirror type, so that its deflections could be recorded on a sensitive photographic plate.

This galvanometer is of special interest. It consists of a minute needle and mirror, mounted with a short suspension, and surrounded by a coil of fine wire, placed in a powerful magnetic field. This instrument possesses a great sensitiveness, and since its vibrating parts are of such delicate proportions, can be relied upon to give accurate results. The field produced by the coil is at right angles to the permanent field, and the galvanometer being acted upon by these two forces, takes up a resultant position, and follows this resultant with unerring accuracy, regardless of the rapidity of the current changes in the coil.

The high shunt resistance on the engine head consists of 27" of No. 30 iron wire stretched back and forth over a sheet of mica and held in place by heavy mica strips clamped over the ends; the whole being held in place by a frame of fiber-board securely bolted to the head. This construction allows the wire to be well insulated electrically, yet exposed to the live steam.

To obtain a constant current supply, a storage battery of high potential was used, with a large resistance in series, giving a current of about .8 ampere.

As the galvanometer and resistance in the engine head were in multiple with this battery, and the change of resistance due to heating in the head was slight in comparison with the resistance in series with the storage cells, the current remained perfectly constant, and a common error in this method of operation was thus eliminated. An arc lamp, especially constructed for the purpose, furnished the light for the mirror of the galvanometer.

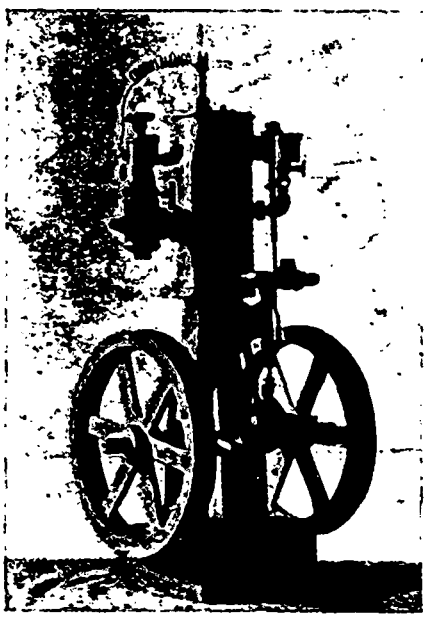
The reflected ray was moved along a slit, behind which a photographic plate was carried up and down by the indicator reducing motion.

The diagram obtained with this heat indicator was almost exactly like the regular indicator diagram in appearance, its lines representing temperatures instead of pressures. The diagrams were taken at various pressures and speeds, and all showed the same characteristics a nearly constant temperature from admission to cut-off, a slight drop beyond this point, a sudden fall at release, and a continual fall on the return stroke until compression occurred, when there was a marked rise in temperature.

Another experiment was also made to determine how deep in the cylinder head the temperature varied. It was found that at a depth of beyond .05 of an inch the temperature of the head did not vary, but remained constant some 30 lower than the temperature of the steam at initial pressure. As the depth was decreased the temperature varied with the steam, and the cards again showed the same resemblance to the first experiments. From this investigation it is evident that the depth of metal affected to cause the phenomena of cylinder condensation is very slight; that the heat cycle in the iron follows the indicator diagram very closely; and that the average temperature at the point where variation ceases is quite near the temperature of the steam.

## NEW GASOLINE MOTOR.

THE accompanying illustration shows a gasoline motor of new design built by Mr. Thomas Reid, of Hamilton. The engine has an open base, the charge of gasoline being drawn directly into the cylinder, where it is ignited by an electric spark. It has an impulse at every revolution, but can at will be closed down so as to have an



impulse every second or third revolution, as desired. The engine is built in two styles, vertical and horizontal, the vertical being preferable for boats and the horizontal for carriages or power purposes. One of these motors has been at work in the maker's premises for some months past, and is said to give entire satisfaction. It is the first motor of the kind to be made in Hamilton.

When an injector fails to work, ascertain if the pipe to the boiler is free and clear, for it may have become partially filled with sediment, thus causing all the trouble.

A contemporary prints the following as a simple method of demagnetization: A strong magnet is placed in a horizontal position on a table, for instance and the watch held horizontally about half a yard off on a level with the magnet. The watch must then be brought slowly nearer the magnet, while being turned slowly, and at the same time as regularly as possible, between the fingers, as on a vertical axis. When the poles of the magnets are reached, the turning of the watch is to be continued while being gradually withdrawn until the starting point is reached.