admitted through the piston, whereby the residual products of combustion are expelled from the cylinder before the admission of the main charge, substantially as herein described with reference to Fig. 6 in the drawings. 4th. The method of effecting the ignition of the charge of a gas or petrolenm motor engine by compressing the same while in contact with a heated surface within, or in communication with the engine cylinder, substantially as described. 5th. The combination, in a gas or petroleum motor engine, of the method of introducing a preliminary charge, and a supplemental charge in addition to the main charge of the cylinder, and the method of firing such combined charge by compressing it while in contact with a heated surface, substantially as herein described. 6th. In gas or petroleum motor engines, wherein the ignition of the charge is effected by its compression, in contact with a heated surface, the method of retarding the ignition till the crank is at or about the dead centre by introducing into the admission passage a charge of combustible mixture weaker than that contained in the cylinder, substantially as herein described. 7th. For producing a weaker combustible mixture for the last part of the cylinder charge, of a gas or petroleum motor engine, the gas admission valve *q* operating in combination with the arm *l* and screw *s* on the rod L, so that the valve is partly closed and the supply of gas consequently restricted during the latter part of the suction stroke. 8th. In gas or petroleum motor engines, every alternate instroke of which is a working stroke, the method of actuating the outlet valve of the engine cylinder by means of a double cam groove *k*, *k*1 turning in itself, operating in combination with a sliding block *o* that actuates the valve. 9th. The circular cam groove *k*1, connected with the outer cam gam groove *k* by means of connecting grooves and a switch *n*, so that when the switch is in one position the block *o* passes consecutively through both the grooves *k* and *k*1, while, when it is in another position, the block *o* is caused to remain in the circular groove *k*1, substantially as and for the purposes set forth. 10th, The governor arm *m*, operating in combination with the spring *n* and spring switch *n*, with inclines and with cam grooves *k*, *k*1, whereby when the normal speed of the engine is exceeded the block *o* is caused to remain in the groove *k*1. 11th. The method of regulating the speed of a gas or petroleum motor engine, by causing the discharge valve for the products of combustion to remain closed when the normal speed is exceeded, so that the products of combustion are retained under pressure in the cylinder, and no fresh charge is consequently admitted until the speed is again reduced and the discharge valve opened, substantially as herein described. 12th. In gas or petroleum motor engines, the enclosed crank chamber G, operating in combination with the inlet valve *y*, cylinder A and piston E, with valve *c*, so as to constitute a compressing pump by which combustible mixture or air is compressed and introduced into the cylinder through the piston, substantially as herein described. 13th. In gas or petroleum motor engines, the removable crank-handle *r*, operating in combination with the pivoted strut *p* for keeping the discharge valve open, and the screw *t* for keeping open the suction valve *g* for starting the engine, substantially as set forth.

No. 26,197. Apparatus for Heating Kilns for Drying or Carbonizing Malt, Grain, etc. (*Appareil pour Chauffer les Fours à Sécher ou Torréfier le Malt, les Grains, etc.*)

Alfred S. Tomkins and Frank A. Cracknall, London, Eng., 10th March, 1887 ; 5 years.

Claim—1st. Constructing transportable apparatus for heating the air supply to kilns, consisting of one or more metal chambers having at one point a fire place for heating it or them internally, and at another point one or more flue pipes leading to a chimney or chimnies, which chamber or chambers is or are surrounded by a metal casing or casings through which the air supply to the kiln is made to pass, so as to become heated by contact with the outer surfaces of the chamber or chambers before issuing into the kiln, substantially as herein described and shown. 2nd. Constructing transportable apparatus for heating the air supply to kilns, consisting of a metal chamber heated internally by a fire, and containing one or more tubular flues, communicating at one end with an outer casing surrounding the said chamber, and at the other end with the interior of the kiln, so that the air entering the said outer casing is first heated by coming in contact with the outer surface of the heating chamber, and then becomes further heated on passing through the tubular flue or flues passing through the interior of the heating chamber, substantially as herein described and shown.

No. 26,198. Circuit Closing Apparatus for Electric Brake and other Circuits. (*Appareil pour Fermer les Circuits des Freins Electriques et autres.*)

Elias E, Ries, Baltimore, Md., U.S., 11th March, 1887; 5 years.

Claim.—1st. The combination, with the cells or elements of a primary or secondary battery, and a normally open working circuit, in connection with one or more cells of said battery, of a current transmitting or circuit closing apparatus placed in said circuit, and provided with an actuating solenoid, and a suitable speed regulating or timing device, and designed and adapted when the working circuit is closed to automatically and uniformly increase the current strength by throwing additional cells or elements into the said circuit, substantially as set forth. 2nd. The combination, with the cells or elements of a primary or secondary battery, and a working circuit containing one or more translating devices, designed and adapted to receive current from said battery, of a circuit-closing apparatus having a series of contact surfaces in electrical connection with individal elements or groups of elements of said battery, a contact lever adapted to make electrical contact with said contact surfaces, and actuating mechanism, substantially such as described, and consisting of a solenoid, and a suitable retarding or speed regulating device, whereby when the circuit to such translating device or devices is closed, the apparatus will be operated to successively and uniformly throw additional elements or groups of elements into the working circuit, substantially as set forth. 3rd. The combination, with the cells or elements of a primary or secondary battery, and a normally open working circuit containing one or more translating devices designed to be operated by said battery, of a current transmitting or circuit closing apparatus having a series of contact surfaces in electrical connection with the individual cells of said battery, a movable contact arm or lever normally in position over the first contact surface, but designed to be operated to come into successive contact with all of said surfaces, and a circuit closing lever arranged and adapted to close the circuit to the translating devices, and to limit the motion of the contact arm or lever, substantially as and for the purpose specified. 4th. An electric current transmitting or circuit closing apparatus, provided with a primary lever for closing an electric circuit, a secondary lever arranged to be operated to gradually increase the flow of current through the said circuit, and actuating mechanism designed to automatically operate the secondary lever to increase the current strength upon the closing of the circuit by means of the primary lever, substantially as and for the purpose set forth. 5th. An electric current transmitting or circuit closing apparatus, comprising essentially a primary circuit closing lever, a secondary contact lever, a solenoid for operating the secondary lever, and circuit connections, substantially as set forth, whereby upon the closing of the circuit by the primary lever, the secondary lever is automatically set in motion to gradually increase the strength or quantity of current flowing through the circuit. 6th. In an electric current transmitting apparatus, the combination of a curved or elongated contact surface, forming one terminal of an electric circuit, a circuit closing lever adapted to be moved to various points along said contact surface, and forming the other terminal of said circuit intermediate devices, substantially such as shown, consisting of a secondary lever, and a suitable actuating and speed regulating mechanism, whereby when the circuit is closed by moving the circuit closing lever, the current flowing through the circuit is gradually increased in strength, and a segment pawl or equivalent device to hold the circuit closing lever in any desired position along the curved contact surface, substantially as and for the purpose set forth. 7th. In an electric current transmitting apparatus, the combination of one or more series of contact points or surfaces, a contact arm or lever designed and adapted to come into electrical contact with said series of contact points, an adjustable stop to limit the travel or sweep of said contact arm or lever, and a suitable speed governing or regulating device to control its rate of motion, substantially as and for the purpose set forth. 8th. In an electric current transmitting or circuit closing apparatus, the combination, with the primary circuit closing lever, the secondary switch lever and one or more series of contact points, of a solenoid arranged to be energized by a portion of the current passing through the circuit-closing lever to move the switch lever into successive contact with any desired number of said contact points, and a governing or retarding device to control and render uniform the operation of said arm or lever, substantially as and for the purpose set forth. 9th. In an electric current transmitting or circuit closing apparatus, the combination with a series of contact points, of an arm or lever designed to be operated to come into successive contact with said contact points, and an adjustable governing or speed-regulating device, whereby the sweep of the contact arm or lever over the series of contact points is completed in a predetermined space of time. 10th. In an electric current transmitting or circuit closing apparatus, the combination, with the concentrically arranged series, of contact points and the centrally pivoted contact or switch lever of a solenoid, designed when energized to move said lever across said series of cantact points in one direction, a spring for moving the lever across said contact pints in an opposite direction, and a dashpot having its piston provided with valved openings of unequal size and designed to govern and regulate the motion of the switch lever, so that it will move in opposite directions at different rates of speed, substantially as and for the purpose set forth. 11th. In an electric current transmitting or circuit closing apparatus, the combination of a normally open working circuit, a series of contact points or terminals arranged to be successively included in said circuit, a mova le contact arm normally in contact with the first contact point of said series, a solenoid in a shunt or derived circuit, and means, substantially such as specified, whereby when the working circuit is closed, the solenoid is energized to automatically move the contact arm from its position over the first contact point into successive contact with other contact points of the series, and thereby cause the working strength of the current in said working circuit to be increased, substantially as and for the purpose specified. 12th. In an electric current transmitting or circuit closing apparatus, the combination, with the transmitting or circuit closing mechanism, of a number of exterior circuits or loops containing devices, and means, substantially as described, consisting of a suitable arrangement of terminal contacts and one or more supplementary switch levers, by means of which any one of said exterior circuits or loops can be placed in circuit with the transmitting or circuit closing apparatus, for the purpose set forth. 13th. In an electric current transmitting or circuit closing apparatus, the combination, with the transmitting or circuit closing mechanism, of a number of exterior working circuits containing suitable translating devices, a supplementary switch lever for connecting any of said exterior circuits with the transmitting apparatus, a circuit closing lever in circuit with and forming part of the transmitting apparatus and a separate cut out switch for each of said exterior circuits, substantially as shown and described. 14th. In an electric current transmitting or regulating apparatus, the combination, with the centrally pivoted contact lever and one or more series of contact points, of the concentrically arranged solenoid and regulating cylinder, and the curved or arc shaped core and piston rod attached to said lever, substantially as set forth. 15th. In an electric current transmitting or circuit closing apparatns, the combination, with the solenoid and switch lever, of a regulating cylinder or dash-pot, having a piston provided with valved openings of unequal size and opening in opposite directions, substantially as and for the purpose set forth. 16th. In an elecric current transmitting or circuit closing apparatus, the combination, with the enclosing case having a rounded or curved top, of the exterior contact points or surfaces arranged concentrically