

to be hinged, and a fixed circular track in which the slide moves. 2nd. A hinge, substantially as shown and described, consisting of a slide connected with the lid or object to be hinged, a connecting slide on which the first slide moves, and a fixed track on which the second slide moves. 3rd. A flush hinge, substantially as shown and described, consisting of an outer semicircular box attached to the under side of the fixed portion, a connecting slide shaped to fit the interior of the box and adapted to move upon its inner surface, and a curved portion attached to the lid, shaped to fit the interior of the connecting slide and adapted to move upon its inner surface, and plus or projecting pieces for holding said parts together and limiting their motion. 4th. A hinge, substantially as shown and described, consisting of the circular slide connected with the lid or object to be hinged, the circular connecting slide provided with a series of grooves, the dentals projecting from the first slide and working in grooves in the second slide, the fixed circular box in which the slides move, and the track and the stop pin attached to said box and projecting into a groove in the second slide so as to hold it in its position and limit its motion. 5th. A hinge consisting of the parts A and B, the slide E provided with slots *a, o* and *n*, the box F, the tracks *g, r*, the pins *h*, the projecting portion *l*, the curved portion *c* and the pieces *b, b*, substantially as shown and described.

### No. 28,446. Apparatus for the Manufacture of Frame Plates for Rolling Stock. (*Appareil de fabrication des plaques de garde pour matériel roulant.*)

Samson Fox, Harrogate, Eng., 2nd February, 1888; 5 years.

*Claim.*—1st. A machine for the manufacture or formation of frame-plates for rolling stock, comprising a head, a movable platform or table, actuating mechanism, a male die, a female die, and a recessed floor adapted to be used in conjunction with punches for producing flanges at one side, and bulgings or embossments at the other side of a frame-plate, substantially as described for the purpose specified. 2nd. In a machine for the manufacture or formation of frame-plates for rolling stock, the combination of a head, a movable platform or table, actuating mechanism, and male die comprising a part C, parts C<sup>1</sup> and C<sup>2</sup> with projections 5, said parts being secured to the principal part C by bolts and cotters C<sub>3</sub>, so that they may be quickly released therefrom, substantially as described. 3rd. In a machine for the manufacture or formation of frame-plates for rolling stock, the combination of a head, a movable platform or table, actuating mechanism, a male die D, floor E with openings, and recesses 6 adapted to be used in conjunction with punches F, G, H, to enter corresponding openings in the male die, so that, when a frame-plate is compressed between the male and female dies, it will be flanged at one side, and be formed with bulgings or embossments at the other side, substantially as described for the purpose specified. 4th. In a machine for the manufacture or formation of frame-plates for rolling stock, the combination of a head A, a movable platform or table, actuating mechanism, a male die comprising principal part C, parts C<sup>1</sup> and C<sup>2</sup>, with projections 5, cotters C<sub>3</sub> and openings at F, G, and H, a female die D, a table or floor E recessed at 6, and puncher F, G, H, all substantially as described for the purpose specified. 5th. In a machine for the manufacture or formation of frame-plates for rolling stock, the combination of a head, a movable platform or table, actuating mechanism, male die I, female die J and floor K, adapted to receive parts L, and mandrels M and N, so as to convert the bulged or embossed parts of a frame-plate previously flanged and bulged or embossed into fillets and square corners, substantially as described for the purpose specified.

### No. 28,447. Gas Engine. (*Machine à gaz.*)

The Gas Engine and Power Company, New York, N. Y., (assignee of Frank W. Ofeldt, Newark, N. J.), U. S., 2nd February, 1888; 5 years.

*Claim.*—1st. In an engine worked by the pressure of an expansive gas, the combination of three cylinders having single-acting pistons, a driving-shaft having three cranks connected to the rods of the said pistons and radiating from the driving-shaft, and having cranks set at angles to each other corresponding to those of the drive-shaft cranks, and slide-valves reciprocated by the relation of the said valve-shaft cranks, to regulate the inlet and outlet of gas to the said cylinders, substantially as and for the purpose set forth. 2nd. In an engine worked by the pressure of an expansive gas, the combination of working-cylinders arranged in the same axial plane and having single-acting pistons, a driving-shaft arranged in the same axial plane as the cylinders, and having cranks radiating at angles to each other and connected to the rods of the said pistons, a valve-shaft arranged parallel with, and rotated mediately by the said driving-shaft, and having cranks set at angles corresponding to those of the driving-shaft cranks, and slide-valves reciprocated transversely or at right angles to the axial plane of the cylinders by the rotation of the said valve-shaft cranks, to regulate the inlet and outlet of gas to the said cylinders, substantially as and for the purpose set forth. 3rd. In an engine having cylinders connected to cranks radiating at angles from the driving-shaft, and a valve-shaft having similar cranks and arranged parallel with the said driving-shaft, the combination, with the said drive-shaft and valve-shaft and with cranks J, I, secured upon the same, of a bar K pivoted to the said cranks and provided with a pivoted support intermediate to the said shaft, for transmitting motion from the said drive-shaft to the valve-shaft, substantially as specified. 4th. In an engine having cylinders connected to cranks radiating at angles from the driving-shaft, and a valve-shaft having similar cranks and arranged parallel with the said driving shaft, the combination, with the said drive-shaft and valve-shaft, and with cranks J, I, secured upon the same, of the bar K pivoted to the said cranks, and provided rigidly with one or more lateral arms *k* pivoted to a crank of the same length as the cranks of the said shafts, said crank being movable around a fixed pin or stud, substantially as specified, to transmit motion from the drive or main-shaft to the valve-shaft. 5th. In an engine worked by the pressure of an expansive gas, the combination of the box-frame A, forming the exhaust-chamber of the engine, vertical piston-cylinders E

and horizontal crank-shafts C, arranged in the same axial plane within the said exhaust-chamber, the valve-chest B arranged above the said cylinders and having ports *e, et*, connecting it respectively with the said cylinders and exhaust-chamber, the valve-shaft D arranged in the said valve-chest above, and parallel with the main-shaft C, and provided with cranks *d* and slide-valves F, and operated mediately from the said main-shaft, and the feed-pump G arranged in the axial plane of the said cylinders and shaft E, C, and having plunger *g* operated by an eccentric *h* upon the said main shaft, substantially as hereinbefore set forth. 6th. In an engine worked by the pressure of an expansive gas, the combination of the box-frame A forming the exhaust-chamber of the engine, and having its lower part A<sub>1</sub> extending endwise, a distance beyond the upper portion A, vertical piston-cylinders E and horizontal crank shafts C, arranged in the same axial plane within the said exhaust-chamber, the valve-chest B, arranged above the said cylinders and having ports *e, et*, connecting it respectively with the said cylinders and exhaust-chamber, the valve-shaft D arranged in the said valve-chest above and parallel with the main shaft C, and provided with cranks *d* and slide-valves F, and operated mediately from the said main-shaft, the feed-pump G arranged upon the extended lower portion A<sub>1</sub>, in the axial plane of the said cylinders and shaft E, C, and having plunger *g* operated by an eccentric *h* upon the said main-shaft, and a shaft C<sub>1</sub> incooting endwise the shaft C, and coupled to the latter by means of the hub *h*, key *c* and clamping lugs *h*, of the said eccentric *h*, substantially as specified. 7th. In an engine operated by the alternate vaporization and liquefaction of a substance, the combination, with the exhaust chamber A<sub>2</sub> and the piston-cylinders and shaft E, C, arranged within the said chamber and with the valve-chest, and valves B F arranged above the said chamber of the channel *b*<sub>1</sub>, having branch channel *b*<sub>2</sub> forming direct communication between the valve-chest and exhaust-chamber, and the safety-valve *b* closing against the seat in the said channel *b*<sub>1</sub>, at a point between the valve-chest and the said branch channel *b*<sub>2</sub>, substantially as and for the purpose set forth. 8th. In an engine worked by the pressure of an expansive gas and having valve-shaft D, operated mediately from the main or driving-shaft C, the crank or wheel *l* free to turn upon the said valve-shaft by motion imparted from the said main-shaft, and provided with a stop-block *s* with pin *s*<sub>1</sub>, and a pinion *m* upon the said pin, the wheel *l* keyed upon the said valve-shaft and provided with a slot *l*, to receive the said block, and a toothed segment *l*<sub>2</sub> to gear with the said pinion, and a wheel *m* movable upon a hub *l*<sub>2</sub> of the fixed wheel *l*, to gear with the said pinion *m*, for advancing the movement of the said wheel *l*, and thereby of the valve-shaft relatively to the loose wheel or crank *l*, in order to regulate the valve-movement, for stopping, starting and reversing the engine, substantially as specified. 9th. In an engine worked by the pressure of an expansive gas and having valve-shaft D, operated mediately from the main or driving-shaft C, the crank or wheel *l* free to turn upon the said valve-shaft by motion imparted from the said main-shaft, and provided with a stop-block *s*, with pin *s*<sub>1</sub>, and a pinion *m* upon the said pin, the wheel *l* keyed upon the said shaft and provided with a slot *l*, to receive the said block, and a toothed segment *l*<sub>2</sub> to gear with said pinion, and the wheel *m* secured to a hand-wheel *M* and movable upon the hub *l*<sub>2</sub> of the said wheel *l*, having flange *t*<sub>3</sub> in contact with an adjoining surface of the hand-wheel, and the said hand-wheel being provided with sockets *m*<sub>3</sub> having enclosed springs *m*<sub>4</sub>, and the end of the said valve-shaft being provided with a disk *m*<sub>5</sub> and a nut to press the said disk against the said springs, to produce friction between the said hand-wheel and the fixed wheel *l*, substantially as set forth. 10th. In an engine for utilizing, as a motive power, a liquid convertible into combustible vapor at a comparatively low temperature, the combination, with a vapor-generating retort communicating with the valve-chest and working cylinder of the engine, a combustion chamber enclosing the retort and a pipe connecting it with the valve-chest, a burner for heating the retort, a supply-pipe leading to the burner, an injector opening into the supply-pipe, and a pipe connecting the retort or vapor generator with the injector, of a tube or chamber P encircled by the said retort, the said tube having openings around its lower edge and connected by a pipe through its closed upper end with the supply pipe to the injector, for the purpose of bringing gas of the highest grade and least density to the burner, substantially as specified. 11th. In combination with the valve-chest, working cylinder or cylinders and oil-pump of the engine, and with the feed-pipe, the gas-pipe, injector, burner, supply-pipe and combustion-chamber, substantially as described, of the retort formed of an inner tubular chamber O, a lined pipe N surrounding the said chamber, and a larger pipe O<sub>1</sub> surrounding the said chamber, and coil N, and wound in opposite direction to that of the said smaller coil N, and the rev. red elbow-joint *n*<sub>1</sub>, the said coils N, N<sub>1</sub>, joint *n*<sub>1</sub> and chamber O forming continuous connection from the feed-pipe *n* to the pipe *o*, connecting the retort to the valve-chest, all constructed and arranged substantially as hereinbefore set forth.

### No. 28,448. Permutation Lock.

(*Serrure à combinaison.*)

Nicholas L. Peterson, Rasmus Jensen and Alexander Crichton, (assignees of Alvin S. Boice, New Richland, Minn., U. S., 2nd February, 1888; 5 years.

*Claim.*—1st. The combination, with the knob-spindle having a rectangular portion *n*, a plate C carrying a catch *f*, and cam-lever *c* having aperture *e*, of the lock-bolt adapted to engage the cam-lever, the knob-spindle and a series of tumblers, substantially as and for the purposes described. 2nd. The combination, with plate C provided with catch *f*, and a vertical rod having a knob E, and cam lever *c* having a swivel-connection with the plate, of the lock-bolt adapted to engage said cam-lever, the knob-spindle *d* and tumblers, substantially as set forth and described.

### No. 28,449. Drive Chain. (*Chaîne sans fin.*)

Joseph A. Jeffroy, Columbus, (assignee of Benjamin Oborn, Marion), Ohio, U. S., 2nd February, 1888; 5 years.

*Claim.*—1st. In a drive-chain, links composed of tubular end bars provided with pin-to seats which are circular in cross-section and