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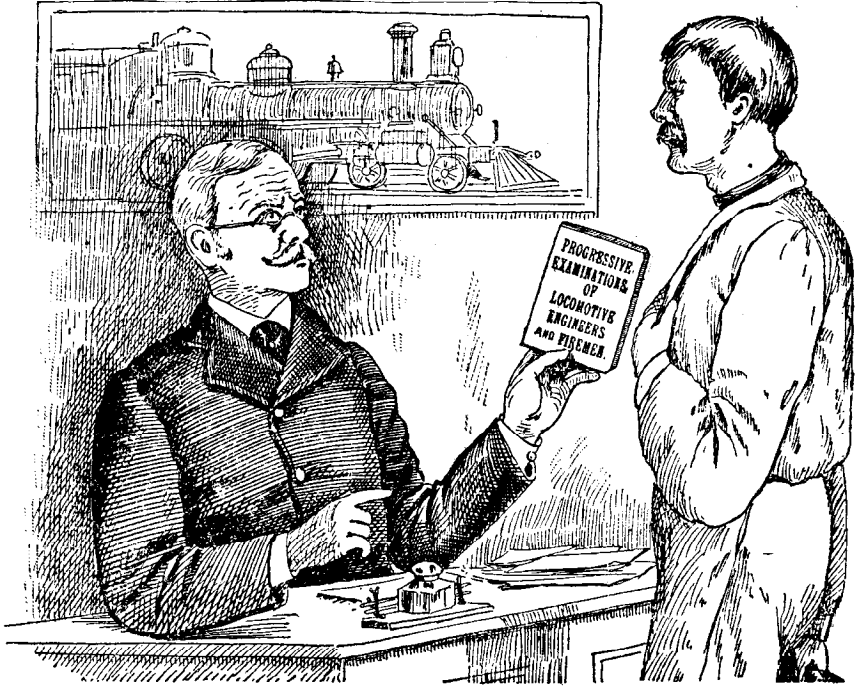
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DEFINITIONS AND CLASSIFICATIONS.—Definition of a locomotive. Classification of locomotives among other engines. Steam engines in general.

THE BOILER.—Fire box (ordinary, Buchanan, corrugated, Wootton, Belpaire, Lentz's). Stay bolts. Mud ring. Fire door. Blower. Ash pan and ash pan damper. Grates, various kinds of (plain, water tube, rocking, etc.). Tubes and their uses. Ferrules. Crown sheet. Crown bars. Stays. Brick arch. Smoke box. Patefcoat pipe and exhaust nozzle. Extended smoke box. Deflectors and spark arresters. Stack (diamond, etc.). Damper. Boiler shell. Boiler seams. Dome. Boiler attachments, various. Safety plug. Gauges, steam. Try cocks. Water columns. Steam-stand. Separator. Pumps, kinds, how driven, where to put. Injectors, kinds, where to put. Check valves. Frost cock. Feed cock. Blow-off cocks. Safety-valves. Dry pipe. Mud drum. Lagging. Jacketing. Manholes, hand holes, and mud plugs. Whistle. Throttle pipe and valve. Steam pipe. T-pipe. Foaming. Priming. Water supply.

THE ENGINE.—Cylinder. Arrangement of cylinders (in American standard engines, in English, in compounds, Shaw's). Cylinder cocks. Cylinder lagging. Piston and piston packing. Piston rod, stuffing box and packing. Guides, crosshead and crosshead pin. Connecting rods. Coupling or parallel rods. Crank pin. Brasses. Crank. Steam chest. Plain slide valve. Allan or trick valve. Bristol or roller valve. Balanced plain D-valves. Balanced Allan valves. Independent cut-off valve, on main valve, on separate plate. Proportions of valve elements, ports, bridges, etc. Valve gear (Stephenson link, Allan link, Gooch link, Walschaert, Joy, Strong, etc.) Valve setting.

THE FRAME AND RUNNING GEAR.—Equalizing bars. Bar frame. Plate frame. Springs and spring hangers. Wheels. Axles. Boxes. Wheel centers (cast iron, wrought iron). Tires. Wheel base. Trucks (regular, and pony or Bissell). Various types of locomotives, as regards their wheels and wheel bases (eight wheeler, mogul, consolidation, decapod, tank, mine, Forney, double-ender, camel back, etc.) Sand pipe and sand boxes. Lubrication of tires. Action of the pistons, cranks, and driving wheels. Adjusting wedges. Adhesion and traction. Balancing. Cowcatcher. Foot plate. Wheel guard. Coupling. Headlight. Tender.

Friction. Bearing metals. Lubricants.
CONTINUOUS TRAIN BRAKES.—Construction of the air brake. Management of the Westinghouse automatic and straight air brakes. Eames' vacuum brake. Management of the Eames' brake. Engine and tender brakes. Train resistance. Performance and cost of operating locomotives. Care and inspection of locomotives in the round house. Running an engine.

PART II.—ACCIDENTS AND EMERGENCIES.

BOILER.—The water supply. Tank valve off its stem. Failure of water supply in the tender. Delay in time of snow blockade. Water out of sight, engine stopped, no injector. Pumps refusing to work, with no injector. Pump on only one side and slide valve broken on that side. Pump on

crippled side, how to work. Injectors refusing to work both the pumps and the injectors falling.

FLUES.—Flue burst. Flue leaky.

BOILER ATTACHMENTS.—Blow-off broken or stuck open. Plugging the hole in the boiler when blow-off is broken. Whistle broken. Safety plug blown out. Try cock broken. Water gauge broken.

DRY PIPE AND THROTTLE.—Dry pipe, leaky, sign of. Throttle stuck open while engine is running. Throttle stuck shut.

STEAM PIPE.—Steam pipe, leaky. Steam pipe broken in smoke box. Steam pipe broken inside boiler.

STEAM CHEST.—Steam chest, burst or broken. Stuffing box gland blown out, with broken lug. Gland body broken.

SLIDE VALVE.—Manner of wear. Wear of seat. Valve broken. Bridge broken. Valve cocked. Disconnections necessary in case of blocking steam pipe or ports. Valve rod broken close to yoke. Valve stem broken inside chest. Valve yoke broken. Stuffing box broken.

CYLINDER.—Slide lubricator falling. Cylinder head broken, cause of. Broken cylinder head, what to do in case of. Front cylinder head broken. Heads, how to take down and put back. Stuffing box broken. Blow-off cock broken off or blown out.

THE PISTON.—Packing, sign of loose. Pistons, how to dismount and replace. Packing a piston. Piston rod key, loose. Springing a broken piston rod.

THE EXHAUST AND ITS SIGNS.—Lame exhaust, seven causes of. Blowing valve, sound of. Blowing only under light throttle.

CROSSHEAD.—Effect of keying crosshead pin too tight. How to key a crosshead pin. Causes of broken crossheads. How to block crosshead at front end; at back end. Crosshead broken.

CRANK PINS.—Crank pin broken. Pin broken close to wheel. Back pin broken on a four-wheel connected engine having the front wheel the main one. Causes of broken crank pins. Crank pin bent.

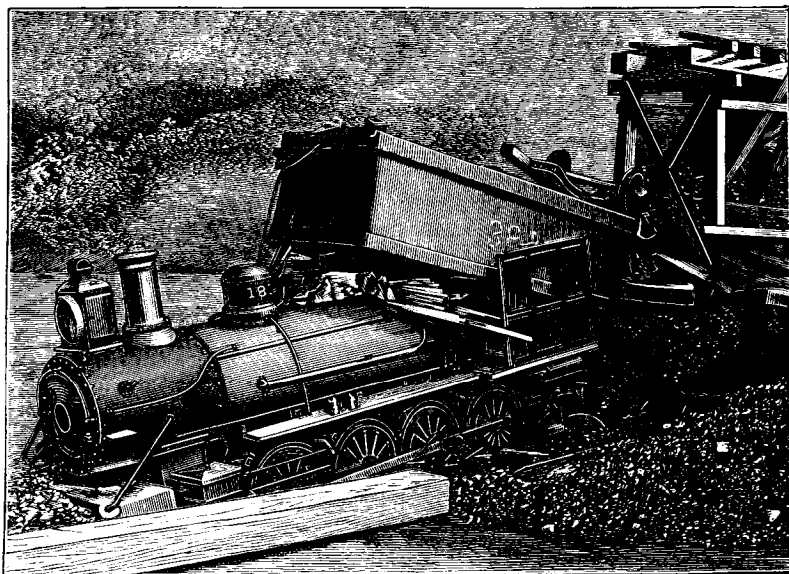
FLING, FITTING AND LINING BRASSES.—Lining side-rod brasses of a four-wheel-connected engine. Lining parallel-rod brasses on a six-wheel-connected engine. Trimming pin-centres. Keying side rods. Keying main-pin brasses.

THE RODS.—Piston rod bent. Main rod set-screw broken. Side-rod set-screw broken. Main rod broken. Main rod and cylinder head broken. Side-rod on a four-wheel engine broken. Rod on a six-wheel-connected engine broken. Middle section rod on a six-wheel-connected engine broken. Front or back section rod on a consolidation engine broken. Middle section rod on a consolidation engine broken. Side-rod broken. Main rod bent. Side-rod bent. Together with full information about POUNDING, SLIPPING ECCENTRICS, BROKEN ECCENTRICS, STRAPS AND RODS, BROKEN LINK HANGERS, ROCKERS ARMS, BROKEN SPRINGS HANGERS AND EQUALIZERS, BROKEN OR LOST TIRES, BROKEN WHEELS, BROKEN AXLES, AIR PUMP AND BRAKE, STARTING AND REVERSING, LUBRICATION, GENERAL DUTIES IN TIME OF BREAK DOWN.

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