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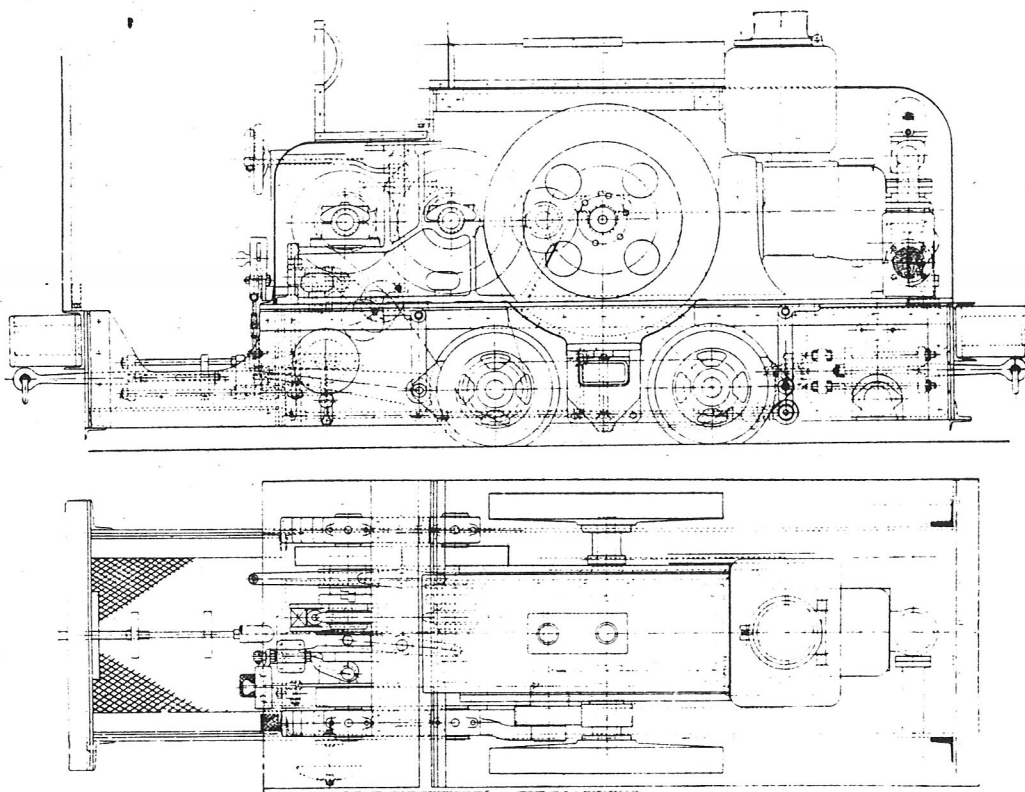
Waltham Abbey EN91AX  
Grossbritannien

**Thieme** Seit  
**schafft**  
**Wissen** 1886

which was carried to the hind end of the engine, and coupled to a similar pipe on the tender.

In the blast pipe, just below the nozzle, was fitted a rotary valve, which left a free passage to the blast under all ordinary circumstances, but which could be turned so as to partially close the exhaust nozzle opening. So that when the engines were shunting, and a small draft required on the fire, the blast could be almost shut off from the ordinary blast nozzle, and lead through the 4-in. pipe to the tender. The arrangement is said to have worked well, but the success of the apparatus as a feed-water heater will be seen to have entirely depended on the ratio of shunting work to running work done by the engine, as well as upon the use made of the device by the enginemen in charge.

(To be continued.)



GENERAL ARRANGEMENT OF THE RUSTON 10 H.P. OIL LOCOMOTIVE.

### AN INTERNAL-COMBUSTION INDUSTRIAL LOCOMOTIVE.

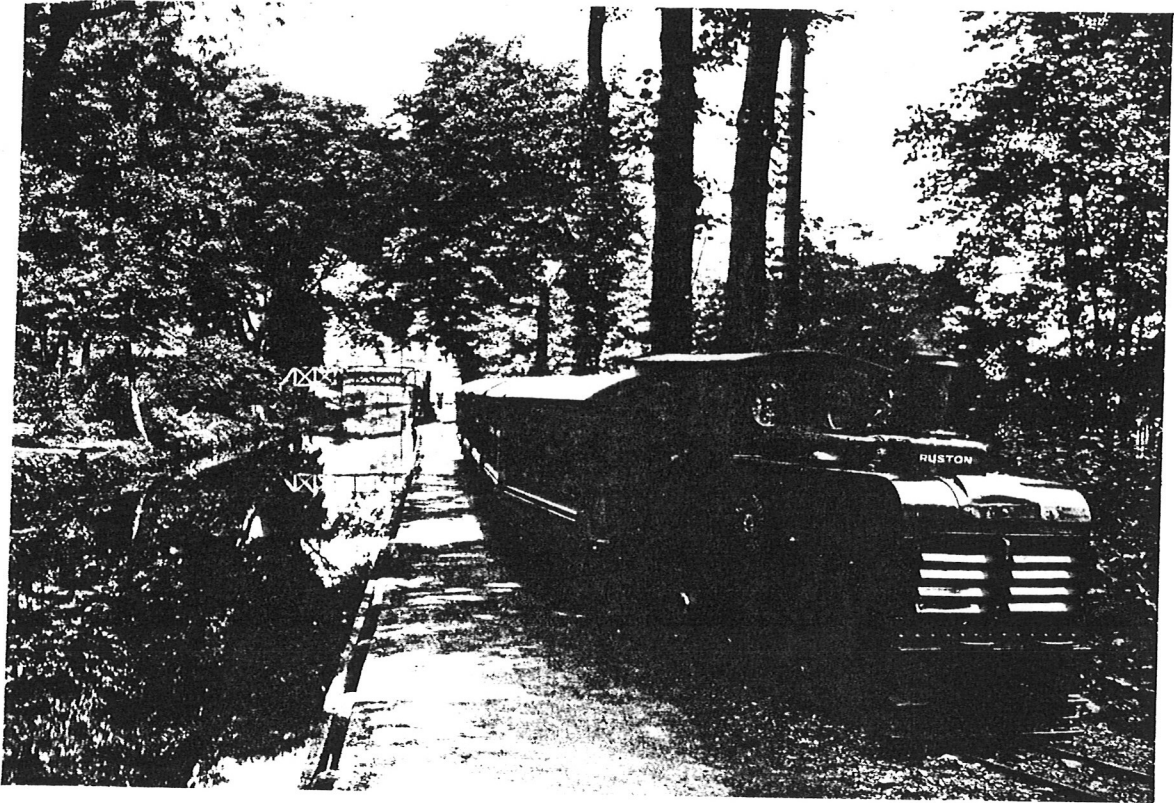
**W**HATEVER may be the future of the internal combustion locomotive for main-line railway working, there can be no doubt that this type of motor has some special and particular advantages where light industrial service has to be considered. The immediate availability for service, complete elimination of stand-by losses, easy manipulation by comparatively unskilled labour (usually one man or boy), immunity from fire risks, easy storage

of fuel, etc., are points so self-evident as to require no further indication.

As applied to locomotion, the remarkable development of the light high-speed motor within the last twenty years, principally for road vehicles, has rather overshadowed the more massive and slow-speed engine from which the former was derived, notwithstanding that the latter still occupies a most important position amongst stationary oil engines. That the slow-speed motor has much to commend it is conclusively demonstrated by the fact of its adoption by Messrs. Ruston & Hornsby Ltd. for industrial locomotives of their manufacture; and the practice of a firm which has behind it more than a century of experience in general engineering and that has been identified with the internal-combustion engine since 1878, cannot be without interest and value in this connection.

Messrs. Ruston and Hornsby Ltd. have produced the locomotive which is the subject of this article, with special reference to the needs of users for a light, flexible and powerful locomotive, capable of withstanding rough service, reliable and simple in operation, and reasonably cheap in first cost and running expenses. In its outward aspect there is nothing startlingly novel, indeed, the appearance of the "chassis" is not unlike that of ordinary steam locomotives of this class, except that coupling is effected by an internal chain instead of the usual cranks and rods.

The motor, together with the transmission gearing, is located in the upper casing, which, though practically dust-proof, is provided with large doors giving access to the moving parts. The framing is stiffly built of steel plates reinforced with angle irons. The axleboxes are external and are supported by coil and leaf springs placed above them. The bearings are of gun metal housed in malleable iron shells which are flanged and slide in machined horn blocks. The four wheels have steel tyres shrunk on to malleable iron centres. All the wheels are powerfully braked by hand, and sand may be applied at need by a foot lever in the cab. The buffing gear is designed to meet as far as possible the rather wide requirements



10 H.P. RUSTON OIL LOCOMOTIVE AT H.M. POWDER MILLS, WALTHAM ABBEY.

commonly found in rolling stock used on industrial lines.

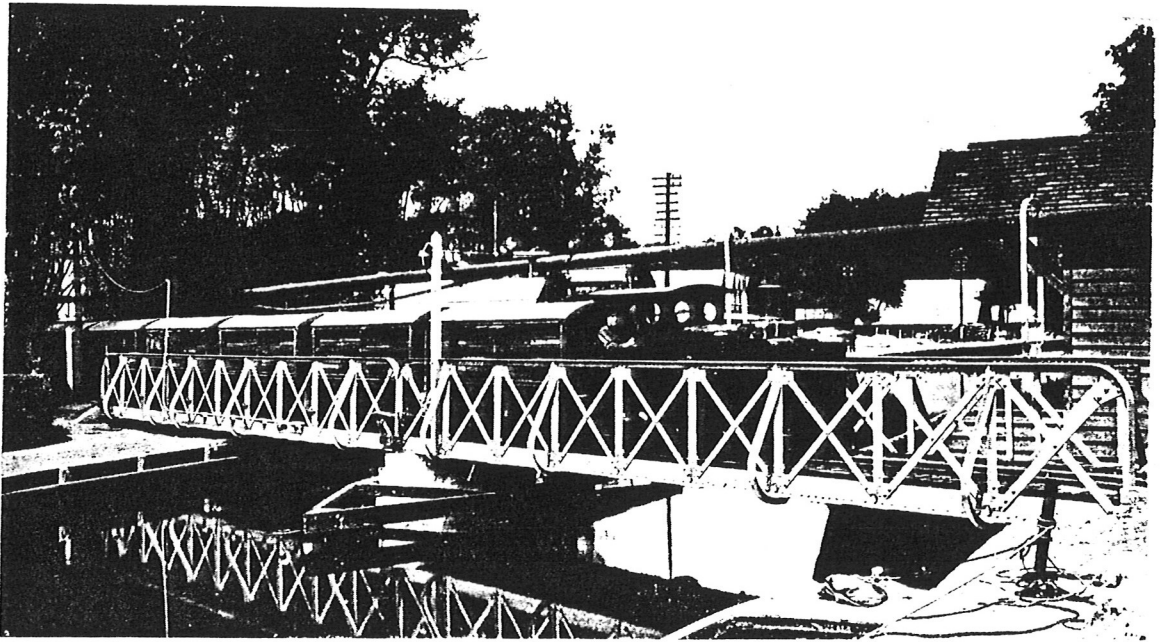
Many interesting features are to be noted in the motive and transmission units. As hinted above, the engine has a strong affinity to the "ancestral form" of internal-combustion motor; and with good reason, since the simple, slow-running, single-cylinder oil engine can hardly be matched for reliability, and gives so much scope for large bearing surfaces, massive flywheels, easy cooling, etc., that the additional weight involved is of little moment, and is indeed positively advantageous for industrial locomotives by furnishing a desirable adhesion weight. A wide variety in combustibles is given; petrol, heavy gasoline, benzole, crude benzole and paraffin may all be used, the consumption with the last named being about 65 lb. per B.H.P. hour. To effect starting without trouble from cold it is customary to run the engine for the first few revolutions on petrol, a supply of which is carried in a special tank provided for the purpose.

The bed plate is a box-pattern casting, massively constructed, bored and faced simultaneously on one machine to ensure perfect alignment of the cylinder and axle bearings. The cylinder and its liner form a separate member of close-grained cast iron attached very securely to the bed plate and ground internally to give a perfect fit for the piston, which is also ground true and fitted with rings. The crank shaft is machined from a solid steel forging and is

carefully balanced. It is provided with very large well-lubricated bearings and carries two heavy flywheels, which are machined on faces and edges. Regularity of running is obtained by means of a powerful governor fitted with a dashpot to prevent "hunting." This governor also controls the lift of the exhaust valve and so regulates the heat of the engine, thereby giving a considerable economy, especially with light loads when using paraffin oil. For this, and other heavy fuels, a simple type of vaporizer is provided, and an efficient carburettor supplies petrol, for starting from cold. Ignition is by high-tension magneto and sparking plugs, and a variable trip gear retards the firing moment at starting to avoid the possibility of back fires.

Cooling is arranged on the thermo-syphon system, the water tank being above the cylinder and requiring no pump or delicate radiator of the kind employed for road vehicles. This latter is an important point for machines intended for rough usage. The chimney-like fitting seen in the views is the vent pipe.

A compactly designed gearing system of generous dimensions gives speeds of three or six miles per hour at will in either direction; the power transmission from engine to gears being by machine-cut spur wheels through two clutch shafts, from which the drive is carried to the rear axle by means of a double roller chain running in an oil bath. The axles are coupled by a second, and independent, chain. Speed changes



RUSTON OIL LOCOMOTIVE AT H.M. POWDER FACTORY, WALTHAM CROSS

are effected by coil spring clutches, operated by a hand wheel in the cab, reversal being brought about through substantial clutches seen at the side of the reversing wheels. The arrangement of the gear controls, etc., is such as can be manipulated with complete assurance by one man, the sight-feed lubricators feeding the various moving parts being also under the immediate inspection of the driver.

Locomotives of this type are constructed for gauges of 16 ins. and upwards, and will readily negotiate curves not less than 30 ft. in radius. Two sizes of engine are manufactured as standards, the leading dimensions, draw-bar pull, and haulage capacity under varying conditions of gradient being set forth in the table below:—

	10 H.P. Loco.	20 H.P. Loco.
Number of cylinders ...	1	2
Drawbar pull at 3 m.p.h. ...	800 lb.	1600 lb.
Gross load hauled in tons		
On level ...	36	72
" 1 in. 200 ...	19	42
" 1 in. 100 ...	13	30
" 1 in. 75 ...	11	24
" 1 in. 50 ...	8	18
" 1 in. 25 ...	3	8
Overall dimensions		
Height over cab ...	6 ft.	6 ft.
Length ...	11 ft. 6 in.	12 ft.
Width ...	3 ft. 6 in.	4 ft. 3 in.
Nett weight... ..	4½ tons	5½ tons

Messrs. Ruston & Hornsby Ltd. introduced these engines about seven years ago; and the number now in service, working under the most varied and arduous conditions, is sufficient proof of the value of the internal combustion industrial locomotive as an efficient and economical haulage agent.

#### NEW CARS FOR THE DISTRICT RAILWAY.

TO cope with the rush traffic the District Railway placed an order for one hundred cars of a new type some time back with the Metropolitan Carriage, Wagon & Finance Company, Ltd., the electrical equipment being supplied by the British Thomson Houston Co., Ltd. On page 49 we show views of the exterior and interior of one of the new trailer cars, the first of which were put into service on Dec. 23rd. last.

The cars are 9 ft. 6 in. wide overall, or 1 ft. wider than the earlier type, and the length, 49 ft. 8 in., or 8 in. more. The extra width is obtained by making the sides slightly curved, and extending the body to the full width of the footboards. The new stock is much roomier than the old; there are no straps, but hand-rails and vertical pillars are conveniently arranged near the doors and open spaces so that standing passengers may have support. The most noticeable and important feature is the arrangement of the three wide sliding double doors on either side of the trailer cars. These doors are placed at equal intervals and are wide enough to allow two passengers to enter or leave the car side by side. The exterior colouring is "engine lake," a much deeper shade of red than the old style of vermilion. The roof is arched instead of clerestory. Internally the lower portions are finished in a teak-brown shade to harmonize with the colour scheme of the upholstery. In the flooring the usual wooden slats are replaced by linoleum. The interior metal fittings and door handles are of Florentine bronze, nickel plated. Special attention has been paid to the lighting; the lamps are fitted in artistic brackets, and the light