

British Locomotive Practice and Performance

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.

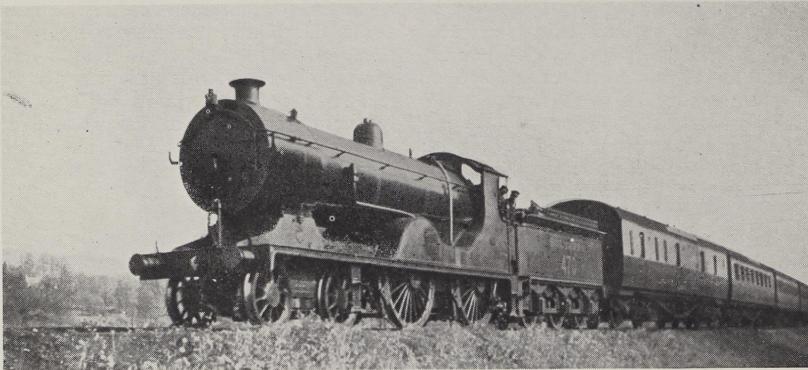


Photo.]

Portsmouth-Cardiff train approaching Westbury, G.W.R.
S.R. 4-4-0 No. 470

W. Vaughan-Jenkins

IN the January, 1939, issue of THE RAILWAY MAGAZINE a question was raised as to the maximum speed ever attained by the single-driver locomotives of Stirling's design on the late Great Northern Railway. Mr. Charles Hutton has conducted an intensive search among the early records, and the highest that he has found for one of the eight-footers was a speed of 84.9 m.p.h., recorded by Mr. Charles Rous-Marten in 1901; previously this well-known authority had twice quoted 83.7 m.p.h., all these figures being later than those mentioned by Mr. E. L. Ahrons as having been recorded in 1894. With the 7 ft. 6 in. 2-2-2 engines of Stirling's design Mr. Rous-Marten recorded 86.5 m.p.h. in 1898, and had not exceeded this figure by 1901. The highest maximum speed that Mr. Hutton has discovered with any type of single-driver locomotive is one of 90 m.p.h. recorded by Mr. Rous-Marten with one of the 7 ft. 9 in. 4-2-2 engines of the Midland Railway. He adds that Mr. Rous-Marten had been trying to obtain higher speeds with the Stirling eight-footers, but unsuccessfully; it took three years before his 83.7 m.p.h. of 1898 was beaten by the 84.9 m.p.h. of 1901. Even in the Race to Aberdeen of

1895, when every nerve was being strained to achieve the fastest possible overall times, no such speeds as these were attained, relatively high uphill rather than downhill speeds being responsible for the fast end-to-end times obtained, and that this was the aim in Stirling's mind with his 8 ft. design is proved by his choice of driving wheels of such large diameter, and, for his time, an exceptionally long piston-stroke. It is not perhaps surprising in the circumstances that the 7 ft. 6 in. singles were slightly the faster engines of the two when it came to maximum as compared with sustained speeds.

Mr. Hutton adds some interesting notes on the probable reasons why all the maximum speed records of past locomotive history are held by coupled engines. He suggests that the limited adhesion of engines with single driving wheels results in slight slipping when running both uphill and downhill; and, he claims, it has been proved by experiment that a single pair of drivers puts in a greater actual mileage between any two given points than the actual measured mileage. The greater the adhesion, so much the less chance of developing this almost



Photo.]

Birkenhead (Woodside)-London train near Rossett, G.W.R.
"Castle" class 4-6-0 locomotive No. 5086, Viscount Horne

[J. G. Muir

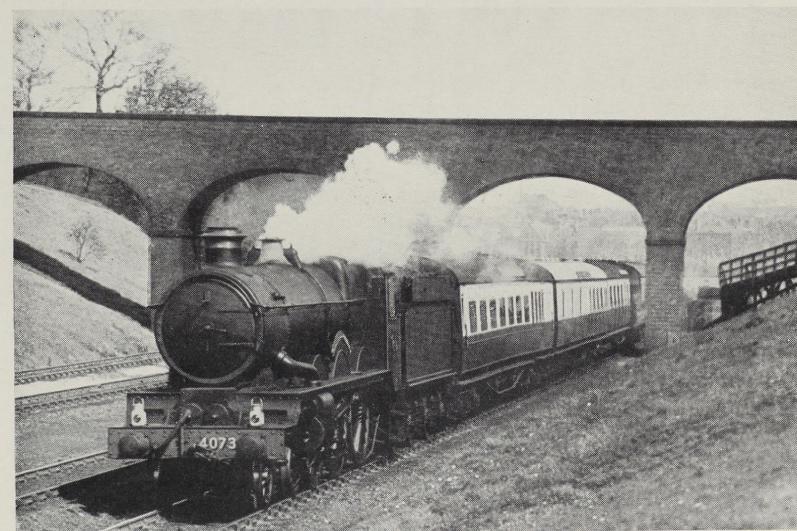


Photo.]

London train leaving Chester, G.W.R.
"Castle" class 4-6-0 locomotive No. 4073, Caerphilly Castle

[J. G. Muir

imperceptible slip. In favour of the modern locomotive better front-end design, with freer passage of steam and reduced back-pressures, as well as multi-cylinder propulsion and improved balancing, have together had a considerable effect in increasing maximum speed capacity; the greater solidity of modern track construction has also made its valuable contribution. But with all these allowances, it is very striking that whereas 90 m.p.h. appears to have been the limit of speed with a single-driver locomotive having wheels of 7 ft. 9 in. to 8 ft. diameter, and we have now no record on which reliance can be placed as high as 100 m.p.h. with a four-coupled locomotive, maxima rising progressively from 112½, 113, and 114 m.p.h. to *Mallard's* 126 m.p.h. have been attained with six-coupled wheels of 6 ft. 8 in. and 6 ft. 9 in. diameter. It is equally of note that in the recent American high speed train-resistance trials with a load of 1,000 tons, it was neither the Pennsylvania 4-6-2 nor the Chicago & North Western 4-6-4 that attained 100 m.p.h. on the level, but the Union Pacific 4-8-4, with eight-coupled driving wheels.

At the moment I do not propose to proceed further with this topic, but to change over to performance forthwith. The steadily increasing competence of locomotive work on the Southern Railway must be apparent to all those who travel over the Southern main lines, and may well furnish a subject for this month's performance. Year after year passes with but little alteration to the timing of the expresses—4 min. off the 2-hr. timing from Waterloo to Bournemouth, 2 min. in the reverse direction and 4 min. off the best Waterloo-Salisbury timings in each direction, for example, represent the maximum that has been done with the fastest steam schedules since the post-war recovery period—but punctuality has now reached a high level. The working timetables also continue to lay down such limit loads as 355 tons as the maximum with which timekeeping is expected on the Atlantic Coast Express, 365 tons on the Bournemouth Limited, and 400 tons on the Bournemouth Belle and other Bournemouth services, yet drivers are showing constantly that they have time in hand with loads from 10 to 25 per cent, in

excess of these figures. The front-end alterations of the "Lord Nelson" 4-6-0s have transformed these locomotives into machines of first class capability; but, as these columns have already borne witness, the phenomenon of present-day Southern locomotive performance is the place that has been taken by the "Schools" 4-4-0s, which display tractive powers by no means inferior to those of the "King Arthur" 4-6-0s, and not far short of those of the larger "Lord Nelson" engines. The 525-ton load of *Clifton* in the last column of the first table is a good example of the power demand that may be thrust upon a present-day 4-4-0 locomotive.

In the first table, showing runs from Waterloo to Southampton, the loads, as will be seen, range from a minimum of 415 gross tons (12 coaches) to a maximum of 525 tons (15 coaches). The Bournemouth Limited figures in the first column, and the Bournemouth Belle, made up to twelve Pullmans, in columns 5 and 6; the remaining runs are on trains having the normal timing of 87½ min. to Southampton Central. For these and the other Southern runs figuring in this article I am indebted to a large number of correspondents.

In the first column the down Bournemouth Limited, headed by 4-4-0 No. 932, *Blundells*, loaded to 31 tons over the nominal 355-ton "limit." The recorder had reason to suspect the use of poor coal in the earlier stages, which explains the loss of 1¾ min. to Basingstoke. Speeds were 61½ m.p.h. at Hampton Court junction, 56 before Weybridge, 65 at Byfleet, 51 at the top of the long rise to milepost 31, 65 at Fleet, and 66½ at Hook, 55 at Worting (steam was shut off for the junction), and 52 at Wootton (52 miles), at the top of the 6 miles at 1 in 249. Down the bank from Litchfeld the acceleration was so rapid that 73 m.p.h. was reached by Micheldever, increased to 84 at Winchester and 86 at Shawford; there was then a reduction to 62 through Eastleigh, and as a result of this energy Northam junction was passed on time, at a reduced speed of 20 m.p.h. From Micheldever to Eastleigh an average of 80.9 m.p.h. was maintained for 15.5 miles. Good work was done through the New Forest; up the rise from Totton to

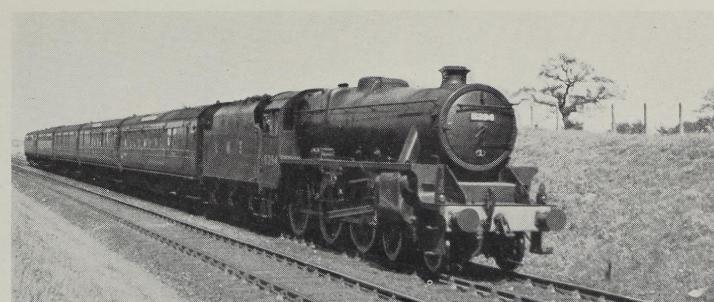


Photo.]

L.M.S.R. Llandrindod train leaving Shrewsbury
"5P5F" class 4-6-0 No. 5394

[R. M. S. Perrin]

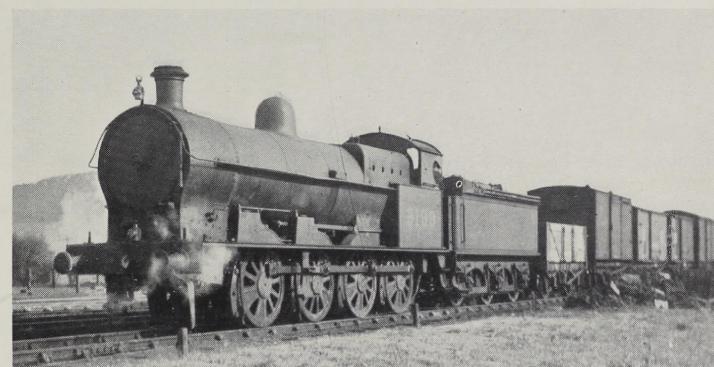


Photo.]

Goods train at Craven Arms, L.M.S.R.
Ex-L.N.W.R. 0-8-0 No. 9199

[E. C. B. Ashford]



Photo.]

Scene at Builth Road station, G.W.R.
The L.M.S.R. line is seen on bridge in background

[W. A. Camwell]



Photo.]

Aberystwyth-Manchester express, G.W.R.
"3200" class locomotives Nos. 3214 and 3211

[E. E. Smith]



Photo.]

Up goods train near Gresford, G.W.R.
"4300" class 2-6-0 No. 4353

[J. G. Muir]

S.R. WATERLOO-SOUTHAMPTON

Distance Miles	Engine, type Number Name	Schedule Load (tons tare) Load (tons full)	4-4-0 Blundells		4-6-0 Sir Madon de la Ponte		4-6-0 Sir John Hawkins		4-4-0 Repton		4-6-0 Lord Hawke		4-6-0 Sir Martin Frobisher		4-4-0 Clifton	
			Schedule 386 415	Schedule 415	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
0.0	WATERLOO	Min. 0 00	0	0 00	0	0 00	0	0 00	0	0 00	0	0 00	0	0 00	0	0 00
3.9	CLAPHAM JC.†	7 7 53	7	7 23	7	6 26	7	41	7 13	8 24	8 00	8 00	8 00	8 00	8 00	8 00
7.3	Wimbledon	— 12 69	—	11 46	10 34	12 32	10 44	12 30	12 27	12 27	12 27	12 27	12 27	12 27	12 27	12 27
12.0	SURBITON	— 17 21	—	17 07	15 25	18 09	17 00	17 00	17 00	17 00	17 00	17 00	17 00	17 00	17 00	17 00
19.1	Weybridge	— 24 30	—	24 13	21 37	25 32	23 36	23 36	23 36	23 36	23 36	23 36	23 36	23 36	23 36	23 36
24.4	WOKING	28 29 40	29 ½	29 22	26 02	31 16	28 33	28 33	28 33	28 33	28 33	28 33	28 33	28 33	28 33	28 33
28.0	Brockwood	— 33 36	—	33 36	33 30	35 35	32 33	32 33	32 33	32 33	32 33	32 33	32 33	32 33	32 33	32 33
31.0	Milepost 31	37 04	—	37 12	32 32	39 33	33 33	33 33	33 33	33 33	33 33	33 33	33 33	33 33	33 33	33 33
36.5	Fleet	— 42 37	—	42 43	37 45	45 41	41 58	41 58	41 58	41 58	41 58	41 58	41 58	41 58	41 58	41 58
42.2	Hook	— 47 57	—	48 19	42 55	51 37	47 35	47 35	47 35	47 35	47 35	47 35	47 35	47 35	47 35	47 35
47.8	BASINGSTOKE	— 53 06	54	53 35	47 54	57 19	52 54	52 54	52 54	52 54	52 54	52 54	52 54	52 54	52 54	52 54
50.3	Wortington Junction	54 55 40	57	56 15	50 25	60 18	55 46	55 46	55 46	55 46	55 46	55 46	55 46	55 46	55 46	55 46
52.6	Wootton	— 58 13	—	58 54	53 08	63 14	58 27	58 27	58 27	58 27	58 27	58 27	58 27	58 27	58 27	58 27
58.1	Micheldever	— 63 40	—	64 45	59 03	69 27	64 18	64 18	64 18	64 18	64 18	64 18	64 18	64 18	64 18	64 18
66.6	WINCHESTER	— 70 08	73 ½	71 36	65 12	76 17	71 09	69 50	69 50	69 50	69 50	69 50	69 50	69 50	69 50	69 50
73.6	EASTLEIGH†	75 ½ 75 07	79 ½	76 54	71 13	81 02	77 10	75 32	75 32	75 32	75 32	75 32	75 32	75 32	75 32	75 32
77.3	St. Denys	— 78 35	—	80 23	75 49	84 02	80 47	78 37	78 37	78 37	78 37	78 37	78 37	78 37	78 37	78 37
78.1	Northam Junction*	80 ¼ 80 11	84 ½	81 44	78 30	88 32	82 18	80 02	80 02	80 02	80 02	80 02	80 02	80 02	80 02	80 02
79.2	SOUTHAMPTON CENTRAL	83 82 34	87 ½	84 34	82 09	91 16	85 09	82 42	82 42	82 42	82 42	82 42	82 42	82 42	82 42	82 42
79.2	Net times (min.)	183	††83	87 ½	84 ½	79	88	85	82	82	82	82	82	82	82	82

*Service slack, severe. †Service slack, moderate or slight. 1Passing Time. ‡Equivalent net time to stop.
§ 3-cyl. "Schools" class. || 4-cyl. "Lord Nelson" class. ¶ 2-cyl. "King Arthur" class

Lyndhurst Road speed increased from 42 to 47 m.p.h., and the mile at 1 in 150 up to Beaulieu Road only lowered the speed from 56½ to 53 m.p.h. Then came 69 m.p.h. before Brockenhurst, 55 at the summit before Sway (good this, after 2¾ miles up, steepening from 1 in 176 to 1 in 103), and 76 down Hinton bank, but there was a signal check to 44 m.p.h. before Christchurch. Nevertheless Bournemouth Central, 107.9 miles, was reached on time, in 115 min. 52 sec. (schedule 116 min.) and in a net time of 114½ min. Passing times were 86 min. 24 sec. to Redbridge (81.9 miles), 91 min. 1 sec. to Lyndhurst Road (85.4 miles), 98 min. 27 sec. to Brockenhurst (92.8 miles), 101 min. 18 sec. to Sway (95.5 miles), 106 min. 24 sec. to Hinton Admiral (101.0 miles), and 109 min. 26 sec. to Christchurch (104.3 miles). The driver was Allen of Bournemouth shed.

The second run features a "King Arthur," with practically identical load; the 4-6-0 made a better start to Clapham Junction, but from Surbiton to Fleet there was a remarkably close correspondence between the times of the two journeys, the speeds of the 4-6-0 being very slightly below those of the 4-4-0. From Basingstoke the 4-6-0 driver had 4 min. more to play with to Southampton than the 4-4-0 driver, and took things more easily, with speeds of 49 m.p.h. at

Wootton and 64 at Litchfield, but speed was allowed to rise to a maximum of 84 m.p.h. before slowing for Eastleigh, and Southampton was reached in 84 min. 34 sec., 3 min. early.

The third column provides an interesting contrast with the previous two runs, for it introduces a "Lord Nelson"—No. 865, Sir John Hawkins—in charge of Payne, of Nine Elms, a fact which in itself is enough to guarantee some lively travelling. On this run the forecast was certainly justified, for Worting was passed in just under "even time" from Waterloo. Speed was up to 60 m.p.h. by Wimbledon, and then fluctuated between 69½ at Esher, 68½ before Weybridge, 71½ at Byfleet, 56 at milepost 31, 65½ at Fleet, 62 before and 68½ after Hook, and 48½ at Wootton, where a slight slack was made. To cover the 40.5 miles from Wimbledon to Basingstoke, mostly "against the collar," in 37 min. 20 sec., was a very fine performance. By Winchester junction speed had risen to 85 m.p.h., and milepost 71 was cleared in exactly 69 min. from the start, but there was a slight signal check before Eastleigh, and a severe one after, so that the total time to Southampton was 82 min. 9 sec.; the net time, including the Northam service slowing, was only 79 min., and this on a schedule of 87 min.



Photo.

Down Continental express passing over 180-ft. welded lengths of rail, near Hildenborough, Southern Railway
E. R. Wetherell

The 14-coach load of *Repton*, in the fifth column, appeared to give some difficulty to the 4-4-0 as far as Basingstoke, to which point there had been a loss of $3\frac{1}{4}$ min.; speed did not rise above 60 m.p.h. at Esher, $61\frac{1}{2}$ at Byfleet, $60\frac{1}{2}$ at Fleet, and 61 at Hook, and it fell to 45 at milepost 31 and 47 at Wootton. But the driver made a determined effort to recover the arrears down the bank past Winchester, covering the 19.2 miles from Micheldever to St. Denys in 14 min. 35 sec., at an average of 79.0 m.p.h., while over the fastest stretch the successive averages were 86.3 m.p.h. from Winchester junction to Winchester, 87.0 from Winchester to Shawford, and 85.1 from Shawford to Eastleigh. These figures do not quite support the maximum of 90 m.p.h. claimed by my correspondent, but the speed must certainly have reached, if it did not slightly exceed, 88 m.p.h. All to no purpose, however, as the train was stopped by signals just beyond St. Denys, and so took 91 min. 16 sec. to Southampton. But for this *Repton* would just have managed a time of 88 min., only $\frac{1}{2}$ min. over schedule. From Southampton to Bournemouth the time for the 28.8 miles was 35 min. 44 sec.— $\frac{1}{4}$ min. inside schedule; speeds were 43 m.p.h. at Lyndhurst Road, 64 before Brockenhurst, 53 before Sway, 79 down Hinton bank, and 47 (slack) through Christchurch. Lyndhurst Road, 6.2 miles, was passed in 10 min. 49 sec., Brockenhurst, 13.6 miles, in 18 min. 31 sec., Sway, 16.4 miles, in 21 min. 30 sec., Hinton Admiral, 19.4 miles, in 26 min. 52 sec., and Christchurch, 25.1 miles, in 25 min. 39 sec.

The next two runs were both made on the Bournemouth Belle, with twelve cars, and reconditioned "Lord Nelson" 4-6-0 engines, *Lord Hawke* with Kylchap exhaust and double chimney, and *Sir Martin Frobisher* with the Lemaitre multiple-jet exhaust. This train is allowed 87 min. to Southampton, and *Lord Hawke* gained 2 min., while *Sir Martin Frobisher* gained $4\frac{1}{4}$ min. on schedule. While the running of *Lord Hawke* was good with this load, it did not include any exceptional feats: speed fell to 51 m.p.h. at milepost 31 and again at Wootton, and the maxima were 66 at Hook and 76 at Winchester. After a considerably easier start—71 sec. slower to Clapham Junction—*Sir Martin Frobisher*, however, was considerably faster throughout, with speeds of 69 m.p.h. at Esher, 61 at Weybridge, $66\frac{1}{2}$ at Byfleet, 51 at milepost 31, 64 before and 69 after Hook, 55 at Wootton, and 77 at Waller's Ash, followed by a slight signal check to 64 at Winchester junction. From this there was a rapid acceleration to 80 before Eastleigh, where a slight slowing was made. The average of 63.9 m.p.h. with this 500-ton train over the 67.3 miles from Surbiton to St. Denys was a fine piece of work, for which Driver Delve, of Nine Elms, deserves credit; net time to Southampton was 82 min., and the 116-min. non-stop timing to Bournemouth of the "Limited" could have been kept with ease. The engine was being worked at 18 per cent. cut-off with roughly one-half regulator on the easier stretches to Basingstoke, and varied to 20 per cent. with regulator about seven-eights open to milepost 31, and 22 per cent. with full regulator up the ascent from Basingstoke to Wootton; these refinements of cut-off position, with movements of 1 or 2 per cent. at a time, have hitherto been seldom seen elsewhere than on the Great Western Railway, and it is of interest to know that the "Lord Nelsons" are now responsive to such delicacies of handling.

The last run in this table shows a "School" in extreme conditions of loading, and was a magnificent effort for a 4-4-0 locomotive. The train weighed 91 tare tons more than the nominal maximum of 400 tons, which apparently applies equally to 4-4-0 and 4-6-0 engines. In comparing the difference at just over 5 min. between the times of this run and the one immediately preceding it, note should be taken of the dimensional differences between the 4-4-0 and the 4-6-0—9.63 cub. ft. of cylinder volume as compared with 12.84 cub. ft., 2,049 sq. ft. of combined heating surface as against 2,365 sq. ft., 28.3 sq. ft. and 33.0 sq. ft. of firegrate respectively, and, in weight, 42 tons and 62 tons of adhesion, and 67 tons and $83\frac{1}{2}$ tons total weight; further, the 4-4-0 was saddled with 25 tons more trainload. The speeds of *Clifton*, ably handled by Driver G. Kerswell, of Bournemouth shed, were 62 m.p.h. at Esher, 56 before, and $63\frac{1}{2}$ after Weybridge, $46\frac{1}{2}$ at milepost 31, 57 before and $63\frac{1}{2}$ after Hook, 45 at Battledown, and two maxima of 76 on the descent to Eastleigh, separated by the slight signal

check at Winchester junction. There were speed reductions to 66 m.p.h. at Eastleigh and 22 m.p.h. over Northam junction. The net time to Southampton was exactly 87½ min., as booked.

We now come to the up journeys, three on the Bournemouth Limited, all hauled by "Schools," and two on the Bournemouth Belle with "Lord Nelson" 4-6-0's. The first two runs were with ten-coach trains, and both had brilliant features. *Radley*, driven by Oborne, of Bournemouth shed, made the quicker start, touching 64 m.p.h. down from Pokesdown, and then, after easing slightly through Christchurch, climbing the 4-mile bank to milepost 100 (the last 2½ miles at from 1 in 269 to 1 in 103) at a minimum of 53 m.p.h.; the corresponding speeds of *King's Wimbledon*, driven by P. Peterson, also of Bournemouth shed, were 63, 53 (Christchurch), and 52 m.p.h. Both engines suffered by permanent way checks in the vicinity of Sway, but maxima of 70 and 75 m.p.h. were reached after Brockenhurst, and high speed was maintained over the three subsequent "humps," with no lower minima than 64 and 68 m.p.h. Then came a very long and severe permanent way check for *King's Wimbledon*, lasting, in fact, for two miles, and costing slightly over 6 min.; as far as Northam junction, therefore, the run had lost 6½ min. actual time, more than offset by checks costing 8½ to 8½ min. From Northam junction *King's Wimbledon*, which had slacked to 18 m.p.h., made the quicker recovery, reaching 59 m.p.h. up the 1 in 526 past Eastleigh, whereas *Radley* was content with 54½ m.p.h. But Driver Oborne, after falling to 53 m.p.h. on the long 1 in 252 which begins at Allbrook junction, accelerated to no less than 58 m.p.h. on the short (½-mile) strip of 1 in 349 beyond Winchester which forms practically the only intermission in the 16½-mile bank at 1 in 252 leading up to Litchfield tunnel. From the 58 m.p.h. maxima he fell back to a steady 54½ m.p.h., covering the 17.3 miles from Eastleigh to Litchfield box in 18 min. 49 sec., at an average of 55.2 m.p.h., and as a result gained 3 min. from Eastleigh to Worting. Driver Peterson, beginning the long climb at a higher speed, fell to 53 m.p.h. at Waller's Ash East, but recovered to 55 m.p.h. at Micheldever, so taking 18 min. 45 sec. from Eastleigh to Litchfield, with the

slightly higher average of 55.4 m.p.h., and gaining nearly 3½ min. from Eastleigh to Worting.

On passing Basingstoke, *King's Wimbledon*, therefore had recovered all but 3 min. of the lost time, and in spite of a strong west wind, which made itself felt in the exposed stretches of the climb to Litchfield. As *Radley* was now well ahead of time (3½ min.), Driver Oborne went a little more easily, with speeds of 73½ m.p.h. before and 69 after Hook, 75 at Winchfield, 62 at milepost 31, 70½ at Woking, and further reduced speed from there onwards; despite a permanent way check to 18 m.p.h. at Raynes Park and a 10 m.p.h. signal check beyond Vauxhall, Waterloo was reached on time. Driver Peterson, continuing his hard effort, touched 80 m.p.h. before Hook, fluctuated between 74½ and 78½ on to Farnborough, and went over milepost 31 at 71, but only to suffer another permanent way check, to 20 m.p.h., at Pirbright junction. From this slowing *King's Wimbledon* was accelerated to 78 m.p.h. at Byfleet, and subsequent speeds were 72 after Weybridge, 78½ at Esher, 67½ at Wimbledon, 72 at Earlsfield, and a slack to 35 through Clapham Junction, more than 2½ min. being thus regained from Woking to Waterloo. A run of this description, apart from being a triumph for a 4-4-0 locomotive design, affords another illustration of the determination of a driver to recover time lost by circumstances not under his own control; the net time on this journey from Bournemouth Central to Waterloo was a bare 108 min., or exactly "even time" for the 107.9 miles, and 10 min. inside schedule. From Basingstoke to Wimbledon the net average speed was 74.5 m.p.h. for 40.5 miles (actual averages were 76.6 m.p.h. from Basingstoke to post 31 and 72.3 from Woking to Wimbledon), and the net times from Southampton and Basingstoke to Waterloo were 76¾ and 41½ min. respectively.

Another brilliant run was made by *Malvern* in the third column; of the driver's name there is unfortunately no record in the log. Two additional coaches, with a very crowded passenger complement, made a gross load of 415 tons. Up Hinton bank the minimum speed was 45 m.p.h.; then came the severe permanent way slowing at Sway. Later speeds were

S.R. BOURNEMOUTH-WATERLOO

Distance	Engine, type Number ,, Name	Load (tons tare) ,, (,, full)	Schedule	4-4-0 930 <i>Radley</i>	4-4-0 931 <i>King's Wimbledon</i>	4-4-0 929 <i>Malvern</i>	Schedule	4-6-0 864 <i>Sir Martin Frobisher</i>	4-6-0 862 <i>Lord Collingwood</i>
				323 345	323 345	386 415		347 370	347 370
0.0	BOURNEMOUTH	..	min. 0	m. s. 0'00	m. s. 0'00	m. s. 0'00	min. 0	m. s. 0'00	m. s. 0'00
3.6	Christchurch†	..	—	6 25	6 38	6 59	—	6 24	6 19
6.9	Hinton Admiral	..	—	9 56	10 16	11 00	—	10 00	9 45
12.4	Sway	—	15 40 p.w.s.	18 09	17 26	—	16 26	15 53
15.1	BROCKENHURST	..	19	19 17	20 46	21 41	20	20 26	18 33
19.8	Beaulieu Road	..	—	23 33	24 44	26 16	—	25 25	22 50
22.5	Lyndhurst Road	..	—	25 54	27 15 p.w.s.	28 52	—	27 58	25 24
26.0	Redbridge*	..	—	29 18	36 13 p.w.s.	32 15	—	31 18	29 13
28.7	SOUTHAMPTON CENT.	..	—	32 32	39 31	38 28	35	35 30	33 20
29.8	Northam Junction*	..	35	34 26	41 32	40 55	—	3 21	3 30
34.3	EASTLEIGH	..	41	40 33	47 50	47 49	9	9 41	9 49
38.2	Wimborne	..	—	44 57	51 52	52 47	—	13 49	13 53
41.3	WIMBLEDON	..	—	48 23	55 14	55 06	—	17 17	17 20
46.1	Waller's Ash East	..	—	53 27	60 41	61 06	—	22 49	22 36
49.8	Micheldever	..	—	57 30	64 41	66 35	—	26 57	26 38
51.6	Litchfield	..	—	59 22	66 37	68 56	—	29 09	28 41
57.6	Wortington Junction†	..	69½	65 36	72 29	75 16	37	36 00	34 44
60.1	BASINGSTOKE	..	—	67 59	74 35	77 32	—	39 10	37 04
65.7	Hook	—	72 37	78 53	82 04	—	44 49	41 51
71.4	Fleet	—	77 26	83 20	86 44	—	52 35	46 44
76.9	Milepost 31	—	82 20	87 46	91 16	—	57 27	51 30
83.5	WOKING	..	92	88 18	96 02	96 28	60	62 51	57 36
88.8	Weybridge	..	—	92 58	100 18	100 24	—	66 51	62 34
95.9	SURBITON	..	103	99 51	106 05	106 10	—	72 40	69 12
100.6	WIMBLEDON	..	—	106 41	110 15	113 16	—	77 56	73 50
104.0	CLAPHAM JUNCTION	..	*111	110 48	113 20	116 45	79	81 52	77 19
106.6	Vauxhall	—	114 20	116 57	120 00	—	85 14	80 54
107.9	WATERLOO	118	118 05	119 26	122 24	86	88 42	83 40
107.9	Net times (min.)	118	113½	108	114½	86	34 + 81	33½ + 82

*Service slack, severe. †Service slack, moderate or slight. §3-cyl. "Schools" class. ||4-Cyl. "Lord Nelson" class

64 m.p.h. after Brockenhurst, and variations between 59 and 67 on to Totton, with a second severe permanent way check before Southampton. From Northam junction speed recovered to 54 m.p.h. after Eastleigh, and on the long ascent there was a steady drop to 46 m.p.h.; the average over the 17.3 miles from Eastleigh to Litchfield was 49.2 m.p.h. Then, from Worting, passed 5¾ min late, there followed a most spirited dash for Waterloo, with an average speed of precisely 75 m.p.h. for the 35.8 miles from Basingstoke to Surbiton—again an astonishing feat for a 4-4-0 locomotive with a 415-ton load. Speeds were 75½ m.p.h. before and 71 after Hook, 74 at Fleet, 70 at milepost 31, 81 at Woking, 80 at Byfleet, 75 after Weybridge, 70 at Esher, and 70 maintained to Surbiton, but then came another permanent way slowing. Eventually Waterloo was reached 4½ min. late, in 122 min. 24 sec. from Bournemouth, but the net time was not more than 114½ min. Of the two remaining runs, both with

Hook, from which it was Farnborough before speed had recovered to 70 m.p.h.; breasting milepost 31 at 67 m.p.h., *Sir Martin Frobisher* covered the next 19.0 miles to Surbiton at an average of 75.0 m.p.h., with maxima of $80\frac{1}{2}$ m.p.h. at Byfleet and 76 at Walton. Adverse signals beyond Surbiton put timekeeping finally out of court, but the lateness of arrival, after all these checks, was only $2\frac{3}{4}$ min., and the net time from Southampton was 81 min. for the 79.2 miles, making, with the Bournemouth-Southampton time, a total of 115 min. net running time from Bournemouth.

In the final column *Lord Collingwood* put up some more first class running, with a 12-car Pullman train of 500 tons; the tare of 471 tons was 71 tons in excess of the rostered maximum. Passing Christchurch at 62 m.p.h., the engine fell to $47\frac{1}{2}$ m.p.h. above Hinton Admiral, and then came speeds of $71\frac{1}{2}$ m.p.h. at Brockenhurst, 59 at Beaulieu Road, $64\frac{1}{2}$ m.p.h. at Lyndhurst Road, and the usual Totton slowing; to Southampton there was a gain of $1\frac{3}{4}$ min. On restarting, the driver worked up to 56 m.p.h. beyond Eastleigh, as a preliminary to yet another of the climbs to Litchfield that are now becoming almost commonplace. But in this case it was a 500-ton load that was worked up the 17.2 miles and the bank at an average of precisely 55.0 m.p.h., the final minimum being $53\frac{1}{2}$ m.p.h. It may be granted that 1 in 252 is not as steep as, say, the ruling 1 in 200 of the L.N.E.R. main line, but on the other hand no bank on the latter has a length of anything approaching 17 miles at 1 in 200 continuously, and the 53 to 55 m.p.h. of three of the runs just described, so steady that they might have continued indefinitely had the grade been further prolonged, are a fine tribute to present-day Southern locomotive performance. Further, the almost exact equality of the "Lord Nelsons'" uphill times with 500 tons to those of the "Schools" with 345 tons would appear to furnish some measure of the relative tractive capacity of the two types. After Basingstoke *Lord Collingwood*, now $2\frac{1}{4}$ min. early, was not pressed, and did not exceed 72 m.p.h. at Hook and Fleet, $66\frac{1}{2}$ at milepost 31, and 70 at Brookwood, and after that came a signal check and even more restrained running. Otherwise a net time of 80 min. could have

been realised without difficulty from Southampton to Waterloo, instead of the actual times of 83 min. 40 sec. gross and $82\frac{1}{2}$ min. net. Again the net running times add up to 115 min. from Bournemouth to Waterloo.

One other run, with a "King Arthur," which I have not tabulated as it was so badly delayed, had some interesting features. The engine was No. 776, *Sir Galagars*, in charge of Driver Delve, of Nine Elms, and the load eleven coaches of 352 tons tare and 380 tons gross. Adverse signals were encountered at Eastleigh, and then a very severe permanent way check at Shawford, but from there a final recovery was made up the 1 in 252, speed averaging 44.2 m.p.h. from Winchester junction, 44.8 thence to Waller's Ash, 45.3 on to Micheldever, and 53.0 from there to Litchfield; Eastleigh was passed in 9 min. 21 sec., Winchester in 22 min. 17 sec., Micheldever in 33 min. 15 sec., Litchfield in 35 min. 16 sec., Worting in 41 min. 22 sec., Basingstoke in 43 min. 35 sec., and Hook in 48 min. 8 sec. My correspondent's speed estimate of $80\frac{1}{2}$ m.p.h. at Hook seems on the high side, as the average from Basingstoke to Hook was only 73.8 m.p.h. Near Fleet there came another bad permanent way slowing, and speed over milepost 31 was only 58 m.p.h., but there was some good running from Brookwood to Esher, with an average of 72.8 m.p.h. over this 13.6 miles. Signals then delayed the train on to Waterloo. Woking was passed in 67 min. 35 sec., and Surbiton in 79 min. 17 sec.; Waterloo was reached in 98 min. 56 sec. The most striking feature of the run was that in gradually accelerating this 380-ton load up the long 1 in 252 to over 50 m.p.h., Driver Delve was using no more than 25 per cent. cut-off, with full regulator.

While we are on the Bournemouth line, some extremely lively "School" performances with light loads over the section west of Bournemouth, which seldom comes under review in these columns, are worth mention. In London & South Western days there were frequent rumours of a schedule as sharp as 15 min. start to stop over the 15 miles from Dorchester to Wareham, but it seems open to doubt whether such a booking was ever seriously enforced. Now, however, although there

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is still no schedule less than 16 min., the "Schools" are observing and even beating the 15 min. time. From three different sources I have received details of runs with four-coach trains from Weymouth to Bournemouth, which in each case contained some hurricane travelling down Wool bank. The start from Dorchester is sharply down at 1 in 110-113 for $\frac{1}{2}$ -mile, and then on easier grades for another mile; after that come 4½ miles of undulations, to just beyond Moreton, and then an unbroken descent for $6\frac{3}{4}$ miles, beginning at 1 in 100 for a mile, and then gradually flattening through 1 in 200 to 1 in 400. In an ascending order of speed, and all with a gross load of 735 tons, No. 923, *Kings Canterbury*, passed Moreton, 5.5 miles, in 6 min. 37 sec., and Wool, 10.0 miles, in 9 min. 54 sec., touching 84 m.p.h.; Wareham, 15.0 miles, was reached in 15 min. 3 sec. No. 927, *Clifton*, cleared Moreton in 6 min. 43 sec., and Wool in 10 min. 9 sec., with a top speed of 88 m.p.h.; slowing to 60 m.p.h. over Worgret junction, the engine stopped at Wareham in 14 min. 44 sec. But all records were eclipsed by No. 928, *Stowe*, which with a lightning start was through Moreton in 6 min. 5 sec., at 81 m.p.h., Wool, 10.0 miles, was passed in 9 min. 8 sec., and a maximum of no less than 95 m.p.h. was attained; then came a greatly over-emphasised slack to 43 m.p.h. over Worgret junction—13.9 miles in 11 min. 45 sec. from the start—and notwithstanding this a stop was effected at Wareham, 15.0 miles, in 13 min. 45 sec. from Dorchester!

As a final direct comparison between a "King Arthur" and a "Lord Nelson" I have tabulated a couple of down runs on the Atlantic Coast Express; in each case that well-known expert, Payne, of Nine Elms, was at the regulator, and the "King Arthur," with 340 tons, had the advantage, by 35 tons, of the 375 tons hauled by the "Lord Nelson." *Sir Gaheris* made the slightly slower exit from Waterloo, but by Surbiton the engine was holding its own and until a signal check (from the Bournemouth Belle ahead) beyond Brookwood, was gaining on *Sir John Hawkins*. Speeds were 59 and 60 m.p.h. respectively at Wimbledon, 68 and 70 at Esher, 70 on both runs beyond Weybridge, 64 and $6\frac{1}{2}$ at Woking, and 61 and 59 at Brookwood; *Sir John Hawkins* went over milepost 31

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Distance	Engine, 4-6-0 No. Name	Schedule	*774	+865
			Sir Gaheris	Sir John Hawkins
Miles	Load (tons tare) " (,, gross)		324 340	356 375
0.0	WATERLOO ..	min.	m. s.	m. s.
3.9	CLAPHAM JUNC. ..	7	0 00	0 00
7.3	Wimbledon ..	—	6 45	6 13
12.0	SURBITON ..	16	10 30	9 55
19.1	Weybridge ..	—	15 07	14 25
24.4	WOKING ..	27½	21 20	20 39
28.0	Brookwood ..	—	26 01	25 22
			29 28	29 00
			sigs.	
31.0	Milepost 31 ..	—	33 20	32 08
36.5	Fleet ..	—	39 05	37 07
42.2	Hook ..	—	44 20	42 05
47.8	BASINGSTOKE ..	—	49 18	46 49
50.3	Wortington Junction ..	54	51 45	49 23
			p.w.s.	
55.6	Overton ..	—	56 48	56 09
61.1	Hurstbourne ..	—	61 11	61 04
66.4	ANDOVER ..	68	65 10	64 57
72.8	Grateley ..	—	70 10	70 06
78.3	Porton ..	—	75 00	74 57
82.7	Tunnel Junction ..	83½	78 30	78 27
83.8	SALISBURY ..	86	82 55	80 20
83.8	Net times (min.) ..	86	79	78

* 2-cyl. "King Arthur" class

† 4-cyl. "Lord Nelson" class with Lemaitre exhaust

at 58 m.p.h. *Sir Gaheris* was taken a little more easily from Farnborough to Worting, to avoid any further *contretemps*, and did not exceed $66\frac{1}{2}$ m.p.h. at Fleet, and 65 before and 69 after Hook, whereas the speeds of *Sir John Hawkins* hovered round 68-70 m.p.h. over this length. Worting was passed at 59 and 63 m.p.h.—*Sir John Hawkins*, having covered 50.3 miles in 49 min. 23 sec., was thus well inside "even time" from Waterloo—and then it was the turn of the "Lord Nelson" to suffer a check, this time for relaying, near Oakley. Subsequent speeds were 81 and $76\frac{1}{2}$ m.p.h. at Hurstbourne, 89 and 87 at Andover, 63½ and 61½ at Grateley (milepost 73½), after climbing 1¾ miles at 1 in 264 and 3 miles at 1 in 165, and 83 and 84 m.p.h. below Porton. Outside Salisbury *Sir Gaheris* was stopped dead by signal, but completed the 83.8 miles to Salisbury station in 82 min. 55 sec., or 79 min. net; *Sir John Hawkins* took 80 min. 20 sec., or 78 min. net—a very close finish.

In conclusion, I have to acknowledge correspondence received from the following readers during the past few months, and read with interest:—Messrs. G. W. Debenham, G. W. Spink, H. J. J. Griffith (2), G. Bradley, H. C. Doyne, W. J. Prowse, Ronald Nelson (3) J. C. Henderson, Dr. T. H. Kirk, Major H. Myers, R.E.C. (2), J. M. R., and "Goliath."

