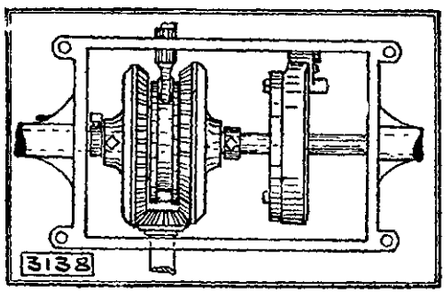
and the manoeuvring of the machine in the oft-times close quarters of a farmyard is made perfectly easy. To the lid of the differential case is fitted an arm; this is jointed to a support in the middle of which is a sliding plunger. When the arm is depressed, the plunger passes through a hole in the lid of the casing, and applies a band brake which is mounted on the differential gear.

In order to transmit power to the cutter-blade an eccentric sleeve and connecting rod are provided, these are brought into operation by means of a hand lever (*A*), shown in the plan view of the tractor. The hand lever is fixed to a short longitudinal shaft (*B*), mounted on two bearings which are fixed to the frame, the forward end of the shaft is bent as shown, and it engages with the forked end of a bent cross-shaft (*C*). Two hanging levers are fixed to the latter shaft, and their ends carry a clutch bridle, for the purpose of engaging or disengaging the positive clutch (*D*). That portion of the clutch which is marked (*E*) is free on the shaft and it has an eccentric turned on it. When the positive clutch is in mesh, the eccentric imparts movement to a reciprocating or rocking arm, to which the cutter blade is attached by means of a toggle-jointed link; it is thereby reciprocated by the throw of the eccentric. To tilt the points of the cutter, so as to bring them down to their work from time to time as required, a hand lever is employed. The lower arm of this lever has, in engagement with it, a hook or catch connected to a chain link attached to the finger-bar of the cutter. When the hand lever is pulled back, it raises the cutter out of action, and the lever then enters a notch in a cross-piece fixed to the support for the steering rod, as shown in the side elevation of these parts. The length of the cutter-blade is five feet; this is considerably longer than the blades of an ordinary horse drawn reaper and a much wider strip of grass can therefore, be mown at one cut.

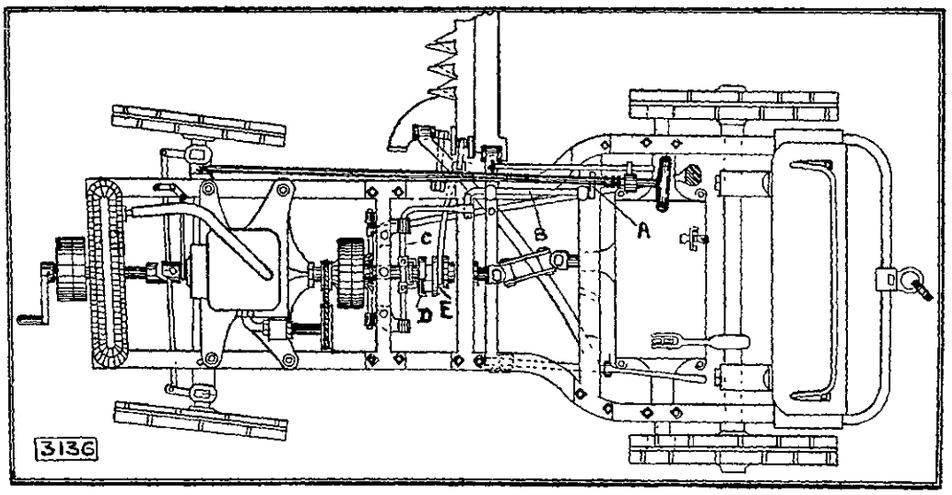


REVERSING GEAR (MOUNTED ON THE COUNTER-SHAFT).

The steering gear of this machine is somewhat novel; the support for the steering rod consists of an upright bracket, which carries an internally-threaded socket or bearing. The steering is effected by means of a long shaft or rod, screwed to suit the threaded socket this rod inclines downwards to the leading axle, and its lower end terminates in a ball. This ball is fitted into a cup-shaped socket screwed into the near side axle-arm. The two axle-arms are connected together by means of a front connecting rod in the usual manner. We can understand that this arrangement may be produced at a low cost, and if the machine is used as a reaper only, there is no reason why it should not prove itself stiff enough for the purpose, but if the machine is to be used on hard lumpy roads, such a method of steering might not last long.

The forward end of the main frame is supported on semi-elliptical springs and the road wheels are of the type usually to be found on all agricultural motors.

The general arrangement of the complete machine is such that its operation is controlled with perfect ease by the driver. The motor and reaper, being combined in the one construction render trailer-couplings and their attendant evils unnecessary. The drawings show that the addition of a pulley for belt transmission of power to fixed or portable machines has been considered, but such an arrangement has not been incorporated in the machine which is illustrated on this page.



PLAN, SHOWING GENERAL ARRANGEMENT OF SHARP'S MOTOR REAPER.

Effect of Wind Resistance.

AN INTERESTING EXPERIMENT FOR THE BENEFIT OF MOTORISTS.

[TO THE EDITOR]

SIR,—During the past motoring season I have watched with considerable interest a large number of events take place handicapped under formulæ which take into consideration wind resistance.

I was wondering whether anyone had any reliable data in regard to the wind resistance of rapidly moving motor cars, and as there did not seem to be much available I thought some test at Brooklands Track would be useful to motorists, and therefore on Friday last, thanks to the courtesy of Mr. Rodakowski and the Brooklands authorities I was allowed the use of their finishing straight, for timing trials on a 38.4 h.p. (R.A.C. Rating) Napier. I had the advantage of the assistance of two R.A.C. Official timekeepers, Messrs. F. T. Bidlake and A. G. Reynolds, who timed the car over each test.

The six-cylinder Napier driven by Mr. Tryon as shown in picture No. 1 had a wind screen erected on it of 30 sq. feet, the dimensions being 6ft. wide by 5 ft. high and being built up of laths 6ft. long and 2in. wide, so that each lath represented one square foot. Sixteen runs were made commencing with the total area exposed to the wind, and after each run 2 sq. feet, *i.e.* two laths were removed, and the result of these runs came out as follows.—

Wind-resistance tests carried out August 16th 1907 on a 38.4 (R.A.C. Rating) six-cylinder Napier car. Timed by F. T. Bidlake Esq., and A. J. Reynolds Esq., official timekeepers Royal Automobile Club. Total area of wind screen 30 square feet.

	Area of wind resisting screen.	Time over flying ¼ mile.	Speed in miles per hour.
1st run	30 square feet	18 4-5 secs	47.85 mph
2nd ,,	28 ,,	18 ,,	50.0 ,,
3rd ,,	26 ,,	17 ,,	52 9 ,,
4th ,,	24 ,,	16 ,,	56 15 ,,
5th ,,	22 ,,	16 3-5 ,,	54 0 ,,
6th ,,	20 ,,	16 1-5 ,,	55 5 ,,
7th ,,	18 ,,	15 4-5 ,,	57 0 ,,
8th ,,	16 ,,	15 3-5 ,,	57 6 ,,
9th run	14 square feet	15 secs.	60 mph
10th ,,	12 ,, ,,	14 2-5 ,,	62 5 ,,
11th ,,	10 ,, ,,	14 ,,	64 2 ,,
12th ,,	8 ,, ,,	13 3-5 ,,	66 15 ,,
13th ,,	6 ,, ,,	13 4-5 ,,	70 25 ,,
14th ,,	4 ,, ,,	12 ,,	75 0 ,,
15th ,,	2 ,, ,,	12 1-5 ,,	73 8 ,,
16th ,,	Normal	11 2 5 ,,	79 0 ,,
17th ,,	15 sq. ft. arranged as gridiron	15-4 5 ,,	57 ,,
18th ,,	24 sq. ft. in two blocks with 6 sq. ft. interval between them.	17 3-5 ,,	51 1 ,,

Besides these 16 runs there were two others, the results of which were very interesting.

First, a run with each alternate lath removed leaving a total wind-resisting area of the screen of 15 sq. ft. The time however for this run was 15 4-5 secs. giving a speed of 57 m.p.h. showing very clearly that although there was actually only 15 sq. ft. of resistance on the screen, owing to the arrangement and apparent extra skin and corner friction, etc., the resistance was the same as if it had 18 sq. ft. of continuous surface. Motorists should take special note of this, as it is pretty good proof that a large number of small protuberances on a motor car are detrimental to its free running.

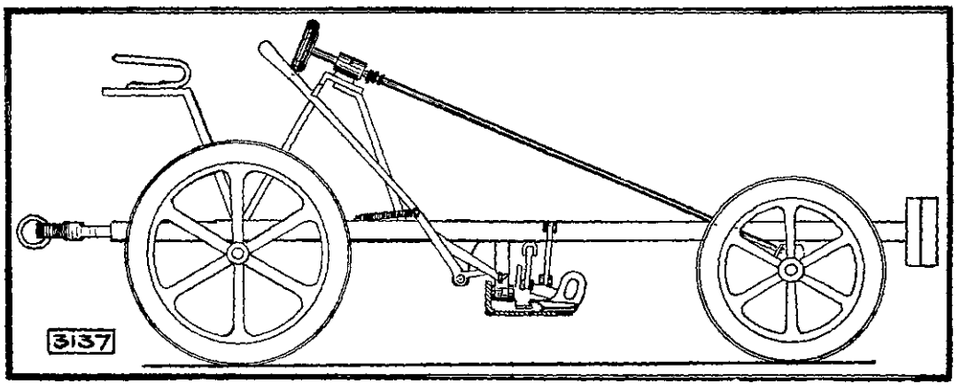
The next test was to have the total area exposed of 24 ft., but arranged in two portions, the top one consisting of 13 sq. ft. solid then a gap of 6 sq. ft. and then the remaining 11 sq. ft. solid, the total solid area exposed thus being 24 sq. ft. but the actual effect on the car was as if about 27 sq. ft. were exposed. It will be noted in going through the accompanying table that the slowest speed recorded with maximum wind resistance was 47.85 miles per hour, whereas the highest was 79, a variation of over 31 miles per hour merely by the addition of wind resistance and practically no additional weight; so all owners of large touring cars with wind shields, limousines, etc., must realise the enormous extra work they are giving their engines to do, and incidentally their driving tyres, when they travel fast against a strong head wind. This extra work is of course only obtained by the consumption of considerably more petrol, and so the varying petrol results that motor-car users sometimes get must be very carefully considered, and the direction of the wind when petrol consumption tests are being made; in fact, the only useful ones are when an "out and home" course is chosen.

The accompanying pictures show, No. 1 the six-cylinder Napier car end on showing the full capacity of the wind screen. No. 2 some of the Brooklands men showing how the laths were removed. No. 3 the gridiron type of wind screen referred to in test No. 17.

No. 4. is a group of gentlemen round the car who assisted me to make the experiments a success, and reading from the left to right they are as follows.—Messrs. Reynolds, Bidlake, two of the Brooklands' mechanics, Staner, Edge, Smith, New and Tryon.

I can only conclude by thanking those who assisted, and particularly the Brooklands track people for allowing the uninterrupted use of their finishing straight. It is merely another example of the extraordinary value that the Brooklands track can be to British Automobilists and I hope at an early date to carry out very much more exhaustive experiments in many other directions, including the effect of weight on speed and petrol consumption without increasing wind area.

If there are any details not mentioned here (which of course I have in a very elaborate degree) that would be useful to other British manufacturers who have not had the opportunity of attending at Brook-



THE CUTTER-BLADE LIFTING ARRANGEMENT