

WIRELESS CALL LETTERS

SUPPLEMENTARY LIST NUMBER TWO

Station.	Call Signal.	Station.	Call Signal.	Station.	Call Signal.	Station.	Call Signal.
S.S. Patrician	BDI	S.V. St. Louis	FOB	S.S. Simla	LEW	S.S. Treglisson	XEM
S.S. City of Birmingham	BDS	S.V. Suzanne	FOC	S.S. Atna	LFC	S.S. Canadian	XFF
S.S. Bardic	BEM	S.V. Vincennes	FOI	S.S. Rena	LFD	S.S. Ranger	XKF
S.S. Rona	BIQ	S.V. Pampa	FVP	S.S. Tysla	LFF	S.S. Naldera	XIN
S.S. Discoverer	EIF	S.V. Cornil-Bart	FZP	S.S. Bonna	LFX	S.S. Narkunda	XIO
S.S. Clan Morrison	EIR	S.V. Bretagne	FZY	S.S. Clan Mac-	LSG	S.S. Clan Macbean	XJD
S.S. Clan Ranald	EIT	S.S. City of Naples	GEO	S.S. jadyen	LSR	S.S. Glenapp	XKF
S.S. Benavon	EJD	S.S. Roseric	GLY	S.S. Clan Murray	LTC	S.S. Port Sydney	XLU
S.S. Queen Alexandra	ELN	S.S. Muttra	GMJ	S.S. Ben Lomond	LUC	S.S. Woodburn	XMA
S.S. Langton Hall	ELS	S.S. Portuguese	GRS	S.S. City of Winchester	LUQ	S.S. Polshannon	XUK
S.S. Sazilby	ELW	S.S. Prince	GSO	S.S. ches-ter	LUR	S.S. Benwood	YCA
S.S. Waitemata	ENV	S.S. Titan	GTI	S.S. Maihar	LUR	S.S. Willaston	YCP
S.S. Grelstone	EPF	S.S. Otarama (ex Ajana)	GVL	S.S. Manaar	MAG	S.S. Glensloy	YDF
S.S. Port Augusta	EPN	S.S. Clon Mac-	GZJ	S.S. City of Ches-	MAG	S.S. Baron Minto	YEK
S.S. Zinal	EQJ	S.S. quarie	GBDX	S.S. ter	MAG	S.S. Glenmoray	YEP
S.S. Scottish Mon-	ERS	S.S. Stockwell	GBDX	S.S. Baron Jed-	MGD	S.S. Redbridge	YHQ
S.S. Erroll	ERZ	S.S. Brockfields	GBDX	S.S. burg	MGD	S.S. Clan Suther-	YJP
S.S. Atlantic City	ETY	S.S. (ex Crosta-	GBDX	S.S. Cassis	MPO	S.S. land	YJS
S.S. Geddington	EUN	S.S. fels)	GBDX	S.S. Kansas	MRW	S.S. Benlawers	YKF
S.S. Clarissa Rad-	EWJ	S.S. Eastminster	GBFD	S.S. Pembroke-	MUT	S.S. Astyanax	YKR
S.S. Norwich City	EXB	S.S. Abbey (ex	GBFD	S.S. shire	MUT	S.S. Ferngarth	YKJ
S.S. Hampstead	EZT	S.S. Heilbronn)	GBFD	S.S. Inventor	MVY	S.S. Atlantic	YLT
S.V. Chateau d'If	FBD	S.S. Trewnnard	GBPZ	S.S. Natica	MZN	S.S. Benarty	YQH
S.V. Colonel De	FBE	S.S. (ex Amimon)	GBPZ	S.S. Ranella	MZP	S.S. Portsea	YRH
Villebois -	FBE	S.S. City of Ba-	GBRP	S.S. Clan Mathe-	MZQ	S.S. Eurybates	YSN
Mareuil	FBE	S.S. tavia (ex	GBRP	S.S. son	MZQ	S.S. Australia	YTO
Marechal de	FBO	S.S. Ganelon)	GBRP	S.S. Moora	OCA	S.S. Priam	YVZ
Turenne	FBO	S.V. Vendee	HRJ	S.S. Mahratta	OCM	S.S. Clan Bu-	YVZ
Marechal Su-	FBP	S.S. St. Antoine	HVW	S.S. Annam	OZN	S.S. chanan	YVZ
chet	FBP	S.V. France	HWF	S.S. Chile	OZV	S.S. Clan Mac-	YXC
S.V. Amiral Cecille	FDD	S.S. Piave	IEL	S.S. Bandoeng	PEW	S.S. kinlay	YXC
S.V. Bouchamp	FDH	S.S. Lepanto	IEX	S.S. Medan	PGA	S.S. Moorish	YYK
S.V. Bonneveine	FDJ	S.S. Marina	IMO	S.S. Menado	PGB	S.S. Prince	YYK
S.V. Bossuet	FDK	S.S. Monte Bianca	ILD	S.S. Batjan	PGV	S.S. Knowsley	YYW
S.V. Desair	FEA	S.S. Adda	IPG	S.S. Bawean	PHJ	S.S. Hall	YYW
S.V. Duquesne	FEB	S.S. Vittoria	IWY	S.S. Bengkalis	PHZ	S.S. Cyrena	ZAW
S.V. Edmond Ros-	FED	S.S. Racconigi	IZJ	S.S. Tosari	PIO	S.S. Sagama River	ZEK
tand	FED	S.S. Yamato Maru	JBW	S.S. Ombillon	PMA	S.S. Tregarthen	ZDE
S.V. Eugene	FEI	S.S. Mitsuki Maru	JDB	S.S. Walcheren	PZH	S.S. Yoserie	ZFN
S.V. General de	FEM	S.S. Tofuku Maru	JDD	S.S. Sydic	SGF	S.S. City of Man-	ZGG
Negrier	FEM	S.S. Singapore	JDD	S.S. Yeddo	SHF	S.S. ches-ter	ZGG
S.V. Genevieve	FEQ	S.S. Maru	JSP	S.V. G. D. Kennedy	SGV	S.S. Rhesus	ZII
Mollinos	FEQ	S.S. Hokkai Maru	JYP	S.S. Bolmen	SHA	S.S. Telamon	ZKA
S.V. Germaine	FER	S.S. West Wind	KJH	S.S. Sloterdijk	TVE	S.S. Polladern	ZMH
S.V. Joinville	FEW	S.S. West Hep-	KINP	S.V. Dieppedalle	UBJ	S.S. Port Lyttel-	ZPD
S.V. General Foy	FHP	S.S. burn	KINP	S.V. Amiral Hal-	UCZ	S.S. ton	ZPD
S.V. Crillon	FHQ	S.S. City of Syd-	KKEI	S.V. zan	UCZ	S.S. Cornish Point	ZPE
S.V. Andre Theo-	FLY	S.S. ney	KKEI	S.S. Kangaroo	VHM	S.S. Clan Stuart	ZPN
dore	FLY	S.V. John W.	KOCR	S.S. South Africa	VNS	S.S. Grelcaldy	ZUW
		S.S. Wells	KOCR	S.S. Calulu	VZV	S.S. Queen Alex-	ZWB
		S.S. Havo	LDC	S.S. Easterner	WGEA	S.S. andria	ZWB
		S.S. Rinda	LEU	S.S. Morrilstown	WGAI	S.S. Hartlepool	ZWS
						S.S. Doonholm	ZXM
						S.S. Normanstar	ZXR

“SEA, LAND and AIR”

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— OF —

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The Editor will be pleased to receive, for consideration, contributions on Aviation, Wireless, the Navy, Mercantile Marine or other subjects within the scope of *Sea, Land and Air*. All MSS., photographs, drawings, etc., submitted must bear the sender's name on back and be accompanied by postage stamps for return if unsuitable. Although every care will be taken of all contributions received, no responsibility is accepted.

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tackled in a practical, determined manner, which substantially spells success. The great Disarmament Conference at Washington is evidence of what lofty ideals and practical determination can accomplish. It may be too early yet to claim that the solution of such ancient problems as the abolition of war, and the establishment of mutual goodwill between the nations of the earth has been achieved, but it at least can be said that many things which thoughtful men regarded as impossible even a few months ago, can now be counted upon as realities. Happenings such as these should inspire us with confidence in our individual ability to play a worthy part in whatever sphere of life our lot may be cast during the coming year. Human nature is an elusive thing, but in its very

elusiveness lies hope for those who are numbered amongst the world's failures. If our natures were the unalterable things they are popularly supposed to be there would be little virtue in seeking to improve the social conditions of this sad old world. Heredity would then be the governing influence of our lives, and the pessimist would reign supreme. But happily these gloomy thoughts have ceased to hold sway over the lives of men, and there is hope for every individual, no matter how great his past record of mistakes or failures, who is prepared to take unto himself an ideal, and work hard to accomplish it. It is because we are convinced it is so that we see in the New Year the beginning of an era of great prosperity for this young Commonwealth.

FUTURE OF AVIATION

APPARENTLY those who hold the future of commercial aviation in Australia in their hands do not subscribe to the doctrine that "if a thing is worth doing at all it is worth doing well." The unfortunate happening which occurred at the inauguration of our first aerial mail service between Geraldton and Derby is proof that no matter how safe or reliable a project may be those responsible for the arrangements should leave nothing to chance.

When the contract between the Defence Department and the successful tenderer, Major Brearley, for the conduct of an aerial mail service in the west was signed, it imposed necessary obligations on both parties. Apart from the practical utility of the undertaking, it possessed features which made it the subject of nation-wide interest. A big Government subsidy was being sunk in a venture possessing great potentialities, but requiring careful handling to ensure success.

It would be a thousand pities if the charge made against the Defence Department, that the landing grounds were insufficiently prepared, proved to be true. The Civil Aviation Branch of the Depart-

ment repudiates the suggestion that the Government failed to fulfil its part of the contract, and there for the moment the matter rests. It is essential, however, if public confidence in commercial aviation is to be retained that in all future undertakings the opportunity for either party to level charges at the other shall be entirely obviated. For a time at least it will be necessary for the Government and private enterprise to co-operate in exploiting the possibilities of the aviation industry. The arrangement of mail services is essentially a matter for the Government, but it is clearly doing the right thing in giving private enterprise the opportunity of showing what it can do in the direction of bringing Australian transport services into line with other parts of the world. Public opinion is behind the compact up to this stage, but the people of Australia will rightly demand that the success of the undertaking shall not be endangered by lack of attention to details which count so much in a matter of this kind. Accidents, it is admitted, are inevitable, and so long as they are not due to carelessness on one side or the other, they are invariably accepted as part of the uncertain game of life. When,

THROUGH AUSTRALIAN WILDS

A PEN-PICTURE OF LIFE IN THE "GREAT OUTBACK."

By FRANCIS BIRTLES

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Few men, if any, know Australia better than the writer of this story, Francis Birtles. He has travelled the continent from one end to the other many times; he has crossed it by bicycle, motor car and aeroplane, and always he has diverted from the easy, comfortable paths by which men are wont to travel, to explore the regions where there are no roads—only impenetrable forests, rugged mountains and dreary deserts. Mr. Birtles knows of the hardships of life outback; of the awful pangs of hunger and thirst, and the indescribable horror of finding himself without means of transport, other than those with which Nature endowed him, hundreds of miles from the nearest habitation. Can it be wondered then that a man who has successfully accomplished such undertakings can write a story—true in every detail—of real Australian life which will thrill every reader?

In the following article, Mr. Birtles tells of his experiences and observations on the memorable motor car trip across the continent.—Ed.

IT was in a twenty horsepower car equipped with personal luggage, photographic outfit, bioscope, firearms, fifty gallons of water and a supply of benzine that I set out from Sydney on the long overland trip to Adelaide *via* Melbourne. My only companion was a bull-dog, "Wowser," who shared my many trying experiences in the days that followed.

The third day out the green grass was left behind, and a drought-stricken country entered upon. With the exception of another car some distance ahead. I had the road to myself, and made good progress. The glare of the setting sun was half screened from my eyes by the dust clouds of the car in front. For about ten miles the road remained fairly good, but as night came on the plain was left behind, and rough country entered upon. Switching on the electric light, the powerful gleam disclosed thousands of rabbits alongside the track, most of them chewing at the bark and roots of the half-dead timbers. Gaunt grey kangaroos stood upright in my path, and emus lying down in the powdery dust made no effort to rise. On the banks of a muddy waterhole I made camp.

A Race With the Tempest.

In the yellow haze of a stifling dawn I was once more under way. A thunderstorm was looming on the horizon. Twenty miles away across the black-soil plains, in a dancing shimmer of heat lay a belt of sand-

hills. Comfort and shelter would be there, here there would be floodwaters, bogs and mosquitoes. I wanted to reach that goal before the storm burst. Already I felt the first splashes of rain, and opening up the throttle I commenced to race the oncoming tempest. Bellowing winds whirled up clouds of yellow dust, through which chain lightning flashed vividly. In the murk of the swirling dust, the car ran into a mob of emus which were also sprinting for the sandhills. They kept on their way ignoring the mechanical monster in their midst. With long, sweeping strides they kept abreast for miles at a speed of thirty miles an hour, finally disappearing in an extra heavy squall of dust.

Bogged in a Bush Creek.

Now the heavens emptied upon the parched regions, and the track became as slippery as a schoolboy's slide. I kept on my zig-zag, slithering way for a few miles more, when suddenly, without warning I found the car buried to the axles in a salt-bush creek. In a sizzling hiss of rain I set to work with shovel and jack. Ends of petrol cases were quickly laid, and before long the car was on the track again. This process was repeated several times until finally I began to knock up. At last, with the wheels of my chariot like unto a steam-roller, packed with sticky earth and dried grass, I reached the edge of the sandhills just as the last traces of daylight disappeared. Crawling under a mulga bush I

rolled myself in a waterproof sheet and went to sleep, forgetting the pangs of hunger. That night the rain fell continuously, and it was bitterly cold. When I awoke it was still raining. True to bush custom I tapped my boots sharply against the ground, at the same time emptying out any undesirable occupants. A six-inch long centipede fell out.

Across the Darling.

That day I crossed the Darling River and reached Wilcannia. Owing to the drought, provisions were expensive. This tin-built hamlet obtains its stores by medium of small steamers drawing flat-bottomed boats in their wake. When the river is up, the price of goods is down, when the waters are down, up goes the price of supplies. So runs the local legend.



The writer of this story, Francis Birtles, taking a cinematograph picture in the wilds of Australia.

Occasionally, in flood time, a boat will take the wrong channel and become caught on a snag or mud bank. Then when the waters recede the little vessel is left stranded, a strange and unexpected sight to the visitor who comes across it in the middle of an apparently parched desert.

Afghans and Camels.

Following a sandy route down the Darling I at length arrived at Menindie, whence the Burke and Wills expedition set out upon its ill-fated journey. In front of the store some fifty pack camels were lying fully loaded for the track. "Wowser," ever a keen student of Nature, proceeded to investigate. One camel standing up promptly gave him a solid left to the jaw

which made him turn several somersaults. He quickly recovered from the rebuff and, getting back on all fours, engaged in a fierce encounter with the "ship of the desert." The Afghans yelled loudly, and the remainder of the camels broke their nose lines and scattered over the desert. The last I saw of them was as they disappeared over the skyline, followed by baggy-trousered, cursing "Ghans." I did not wait to see the home-coming, but a trail of cast-off pack-saddles and stores, also a new shirt fluttering from a mulga bush some fifteen miles out, and a powerful odour of camel told me that they were still going strong.

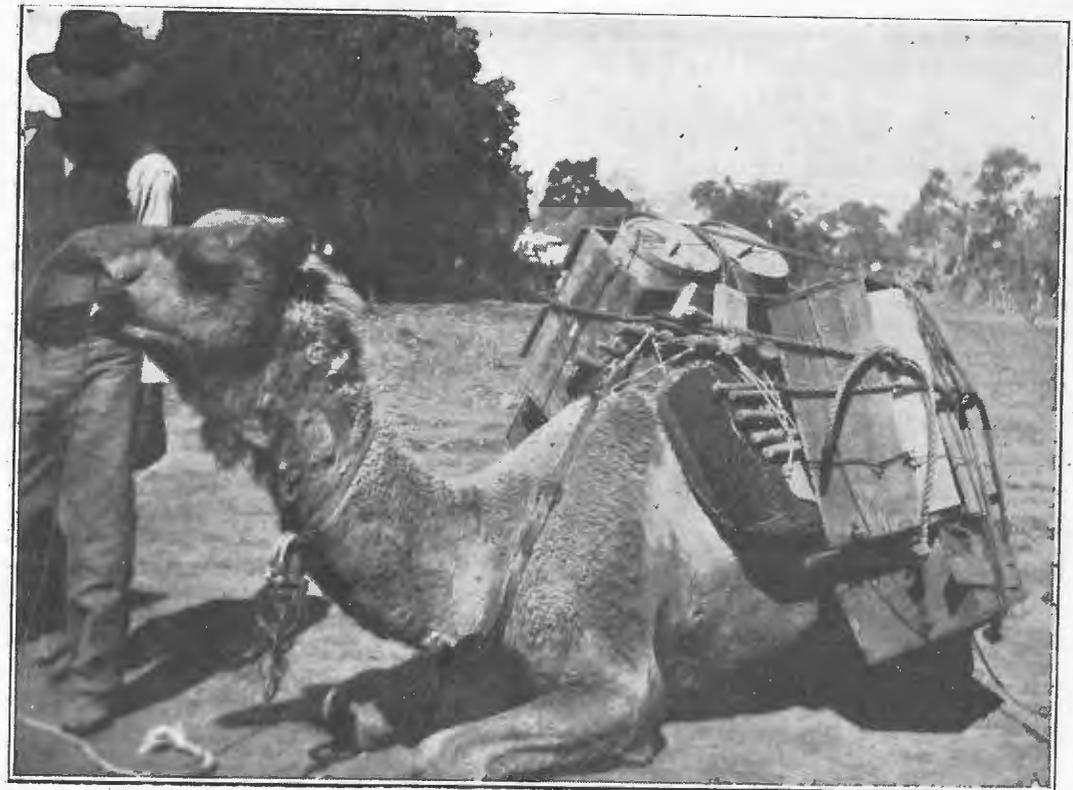
The Start from Adelaide.

Passing through Broken Hill and its famous mines, I continued my journey to

Adelaide, where I had decided to fit out this expedition for the rough journey across the continent to the shores of the Gulf of Carpentaria, some two thousand five hundred miles north. Stripping the bodywork, running boards and mudguards, I had a light platform bolted to the chassis, with detachable flooring, which could be taken off and laid down under the wheels when bogged, or in heavy sand. Empty benzine cases were strapped down to carry my equipment, these being preferable to heavier boxes, as I could thus easily handle everything without undue strain. Space was reserved for eight cases of petrol, oil, and five eight-gallon drums of water. I had already fitted oversized tyres, and as

these would have to be semi-deflated when crossing desert sandhills, I equipped a second set of security bolts to prevent the covers from creeping. Of personal comforts I took nothing. My medicine chest contained alum (for purifying and settling deposits in water), pot. permanganate (for insect and snake bite), chlorodyne, quinine and ointment. Flour, sugar and tea were my mainstays in the food line, and I depended on my rifle for meat. Cameras, pick, shovel, and compass were also carried,

gravelly hillsides were alive with rabbits. This was all changed now, and from a drought-stricken land "bunny" had disappeared, having either perished or migrated to more hospitable surroundings. The Australian rabbit is a born explorer, and has established his pioneer colonies in regions where white men never venture. He is a creature of great adaptability, and will find supplies either above or below ground. In the mulga district he is often to be seen twenty feet up amongst the



[Francis Birtles Photo.]
In Central Australia the camel is utilised largely for transport work. This photograph shows a "ship of the desert" loaded with benzine about to start on a long journey.

and a rope and bar for a Spanish windlass to haul the car up steep creek beds. Big crowds gathered to witness my departure from Adelaide on March 13, and a procession of motor cars came out for some miles to speed me on my way.

The Passing of the Rabbit.

On the second day out from Adelaide I reached Wilmington Pass. On previous trips through this country the steep,

scrubby branches, feeding from the leaves and bark, or lying at full length on a swaying limb sound asleep in the warmth of the morning sun. At the sound of the oncoming car, bunny leaps nimbly to the ground, and disappears into the limestone burrows. He does not remain there for long, however, as these retreats get very hot under a glaring sun. For his moisture the rabbit gets sustenance from the roots of mallee and sugar gum, and he often

thrives for months fifty miles away from water. Nevertheless, he is very partial to liquid refreshment when it is obtainable, and it is advisable not to leave one's water-bag lying unattended on the ground. Buck rabbits have sharp teeth, and the new-chum will find himself waterless and stranded through lack of this little bit of knowledge.

Under the Desert Moon.

When the rabbits were plentiful in these lands it was interesting to watch the scene at a desert rock-hole on a moonlit night. The pool would be surrounded by hundreds of rabbits—two and three deep—waiting their turn to drink, and making a strange sipping noise as they lapped up the lukewarm liquid. Suddenly the line breaks away at one end and three dingoes come trotting down with a lordly air. These greedily drink a few mouthfuls, and then jump into the pool, still drinking as they swim about. The motor smell evidently overcomes the scent of man, as presently they came out to investigate. With peculiar sharp, swerving trots they circle around my camp. From my "bunk" on the hard ground I make a sudden cat-call and hiss. The leader bounds several feet into the air, and stumbles backwards over his companions. These latter half slew round, showing their white fangs and snarling, with hairy bristles standing up on their backs, and bushy tails bent sideways. They appear to blame their leader for not recognising danger ahead. Suddenly they dash away for the skyline, and as suddenly changing their minds again, return. This time they appear close at hand, taking whatever scanty shelter the surroundings offer. Presently a long-drawn-out wail sounds from far away. For a moment they stand at attention, ears erect and wonderfully alert. Then giving the dingo call in reply, they turn and trot silently away into the mysterious desert scrubs.

Trans-Australian Railway.

The country along this line is probably the most dreary in Australia. To the passenger it is quite devoid of scenic beauty. One must live in this land to appreciate its peculiar charm. As to its commercial value time will tell. Scores of miles of unexplored plains and hundreds of miles of mountains stretch away to the north and west, and it is possible that some day opal, gold and copper will be discovered there.

Beyond Port Augusta, especially to the west, giant outcrops of granite rock are a feature of this country. Here the overlander gets his supply of drinking water. Curious post holes are formed by some queer, unexplained natural method, and rain waters drift into these six-foot deep pits. Aborigines place flat rocks over the mouth of the holes to keep out dingoes and emus, which have a habit of using these as a foot-bath, the opening generally being too small to admit of a complete dip. The purest and coolest waters are to be obtained from the rarer "Gnamma" holes, a crevice in a giant boulder, the water supply being either a spring, soakage, or an accumulation of liquid "sweated" out of the rocks by extreme changes of day and night temperatures. For a distance of nearly two thousand miles these were the only surface waters, there being no creeks, lakes, or rivers. The map shows lakes, but these are only dry salt pans. In regions where there were no natives, the rock-hole waters were in a vile condition. Rabbits and small birds jump in and cannot get out. I have had to drink water out of a five-gallon rock-hole averaging one stale rabbit per gallon of water. Scramble over a hundred feet high mound with a quart billy-can in your hand, and a forty horsepower thirst. Get to leeward, sniff, and you will find what you are looking for. Boil the water, strain through ashes and reboil. Then put plenty of leaves in, sweeten it well, hold your nose tightly with the left hand and lift the pannikin to your mouth with your right. Gulp quickly before the flavour has time to impress itself upon your palate. Then, if night has fallen, go to sleep and dream of long, ice-cool drinks in a city café. You will probably wake to take another sip and find that the black ants have tried to alter the flavour by committing suicide in the "refreshing" beverage. This is but a brief glimpse of a pioneer's life in a desert.

At Farina township in South Australia I loaded up the car with supplies of benzine. The once-a-fortnight train bound for Oodnadatta gave me a parting cock-a-doodle-do whistle, the passengers leaning out of the carriage windows cheered, as in the sunset glow we headed out into the sandy waste bound for Birdsville, hundreds of miles away. The old pioneers vowed that the car would never get through. Teams of donkeys were on the way to the

railway siding, the waggons axle deep on drift sands. I kept going nearly all night; it would have been impossible to halt as the wind-blown sandhills would have submerged the car. In the daylight I sighted one of the peculiar six-foot long monitor lizards, somewhat of a cross between an iguana and a crocodile. Although these reptiles never see enough water to swim in, they are semi web-footed. This fellow was circling round and round a three-foot mound of chopped sticks—the home of the desert rat. A howling sandstorm had now

and following the "drainage lay" of the country, I sighted for a moment a windlass—Box Tree Flat—and well.

Theorising in the Desert.

As I rested that night at Box Tree Flat oasis I noticed, more particularly, a phenomenon which had often struck me as interesting. The atmosphere was heavily charged with electricity. As I ran my fingers through my hair it made a crackling sound. I stroked old "Wowser," and the result was a miniature fireworks display.



"Chums" in the "Great Outback."

[Francis Birtles Photo.]

started. Sometimes I could not see the radiator cap. The torrents of grit chafed the flesh of my face and arms as I struggled to keep the car head on to the gale. I swung her along to be ready at any moment to charge through drift or sandhill. Down a steep, sandy slope at twenty-five miles per hour, half way up the bank on the other side and the engine stalled. Recognising that I was trapped, I tried to go down the dry creek and found that the eddies of wind had swept the bed clean down to the firm gypsum and limestone underneath. The banks now flattened out,

Lying out there listening to the wind howling its wild passage across the sandy waste, I commenced to theorise on the foundation of electrical energy, and would commend the theory evolved to our scientific professors. I have frequently noticed that over areas where great friction is generated by violent gales of wind electrical discharges are common, be it either in desert lands or Antarctic regions. To give a few illustrations of what is meant. On Sturt's Stony Desert of Central Australia there are many scores of miles of boulders about the shape and size of a foot-

ball, packed tightly together. These are worn into shape and highly polished by the continual drifts of sand moving rapidly over their surface. The effect of billions and billions of grains of sand flying along before a fifty-mile gale, must be to create an enormous amount of friction, which makes a storehouse for electric power. The same thing occurs in Polar regions, and wherever mighty winds blow across great open country. Is it not probable that the winds create this mysterious power, which is also closely akin to animal magnetism? While on this subject it is interesting to note that the "water diviner" is only able to locate running water, and a green forked stick is part of the necessary equipment. Running water creates friction, and on this theory friction creates electric current. A green stick contains moisture, and moisture conducts electricity. The human body to a greater or lesser degree also acts as a conductor, hence the more marked success of some individuals. A number of trees, especially the willow, bend to the waters, owing maybe, to electrical attraction. Desert trees do not act thus; with the exception of the Kurrajong they turn upwards.

Across the Strezlecki.

Early next morning I left Box Flat. Heading away into the left I came on to the Strezlecki River—waterless, sandy and forbidding. For over a mile I tramped across the sandy channels of the river bed, on the opposite side of which sandhills, scores of feet high, had been built up by the southerly "busters." I returned to the car, and followed the river of sand upwards for some miles until I came to a spot at which by charging down the steep incline, racing the engine and slipping the clutch into low gear, I just managed to get over. Here, on a little dried-up salt pan I discovered that scores of thousands of rabbits had perished in the shelter of the stunted salt bushes. The stench was vile, and mobs of half-starved dingoes were wandering round seeking for tit-bits, or crouching in the scanty shade of the small shrubs. They took no notice of the car, and I hurriedly left the evil-smelling locality.

The "Scalded Plains."

I pursued my way over miles of "scalded" plains, so called because the hot sun scalds up all sign of vegetable life. A few hundred yards away I sighted a mob

of dingoes. Putting the engine at full speed I dashed into the middle of them, causing a general scatter. Selecting one particularly healthy-looking dog, I put the car at him. The yellow "cuss" scampered away in a cloud of dust, his ears laid well back, and his teeth showing in a semi-sardonic grin. Putting all his heart into it, he headed for the far-distant sandhills, with the car, at twenty-five miles an hour, in hot pursuit. Suddenly the old bush outlaw slewed round, made a frantic spring at the car, missed, and was promptly bowled over. Looking back, I saw him "all out" returning over our tracks. At that I let him go, in spite of "Wowser's" reproachful glances.

The Elusive Shade.

It is now dinner time. There are some fine big shady trees about six miles ahead, and I decide that there I shall have a spell. Alas! for the land o' my dreams! I run half a mile and find the beautiful "shady trees" have become three-foot high scraggy bushes, with perhaps thirty green leaves on the lot. I sit in the shade of the car eating my lunch. Near by the dingoes wail mournfully. Presently the wailing ceases, and they start to dig out a small bunny warren. A young rabbit rushes out and into one of the small bushes. Two of the hunters give silent chase. One pounces with two fore paws on to the scrub, then with ears pricked up, listens for any movement. A scramble and a squeal follow and bunny is greedily swallowed whole. Fifty yards away the edge of a glittering fresh-water lake, probably of unknown depth, stretches away to the skyline. The surface is dotted with clumpy little islands. A cool drink and a swim would be ideal. Alas, 'tis but the desert mocking me, for the lake is only a mirage which has lured many a thirst-tortured man on to madness, and the cruellest of deaths. The wind has now dropped. The heat becomes intense and I lay down and fall into a deep sleep. "Wowser" growls and awakens me. In the distance I see some human beings—niggers. As they approach I count seven of them. One old gin is carrying a "coolamon" (wooden dish) very carefully under her arm. This contains water. A lubra has a piccaninny perched on her skinny shoulders, its little chubby fingers grabbing her long woolly hair. This young lady carries the day's rations—a starved, half-dead iguana, which she drags long with its

tail in her claw-like hand, the reptile's head, with gasping mouth, trailing in the dust. A young buck, with careless, jaunty strut walks in front of her, carying naught but a light wooden kangaroo spear. Some white-headed and white-whiskered old aborigines form the rest of the party. One of the old fellows has white clay in his beard and hair, by which sign I know that the group is in mourning. I greet them with two uplifted fingers. From behind the old gin a shy little youngster, finger in mouth, reluctantly appears. I give them all some boiled lollies, the two "ladies" of the party receiving their allowance from the dignified and oldest member. Seeing that I have observed native etiquette and manners according to their customs, they become more friendly. The "buck" becomes inquisitive, and starts to examine the car. "Wowser" underneath, makes a pounce and a grab, but I caught hold of him just in time.

The niggers cackled with mirth, and cautiously peer under the car at the bulldog, who is now chained up. The lubra tries to make a face with the same expression. Meanwhile, the native mongrels appear on the scene, grab the iguana and take all the little life that is left in it. Curses

and wails arise. I start the engine and call out, "all aboard." This is "Wowser's" signal to mount guard on top. The niggers yell, and away we go out on to the Great Sandy Desert. Here poor King, the sole survivor of the Burke and Wills expedition, wandered around, half perished and exhausted, until the wild aborigines found and adopted him as an honoured member of their nomadic tribe.

Sturt's Stony Desert.

Leaving the haunts of these aborigine wanderers I headed nor-east for Innamincka. On the way I encountered heavy sandstorms and gales of great violence. Through the yellow torrents of dust, the sun showed a blood-red disc of fire. All the exposed parts of my face and hands bled from the never-ceasing friction of wind-blown gravel. In this dry atmosphere my finger nails became brittle, my lips cracked, and the woodwork of my cameras shrank and split. Tired and knocked up, a week later I came out on to the great stony plains—Sturt's Stony Desert. Blood-red was the predominating colour below; overhead, there was a brassy blue sky, flecked with wind-blown clouds.

(To be continued.)

AMERICAN FLYING CRUISER'S RECORD

The return of the giant Aeromarine flying cruiser *Santa Maria* at Key West, marks the completion of the most remarkable performance in the history of aviation, writes an American correspondent. The journey was a continuous demonstration flight of six thousand miles from Key West along the Atlantic sea-board, over the waterways of New York State, along the Great Lakes, down the Mississippi River Valley to New Orleans and thence along the Gulf back to Key West.

To this remarkable record must be added approximately two thousand seven hundred and twenty-five miles flying which the giant flying cruiser has done at each of the cities she visited during the historical flight.

Her log shows that from the time she was launched by Governor Edward I. Edwards, of New Jersey, in June, 1920, the *Santa Maria* has flown upwards of twenty-

five thousand miles and carried thousands of passengers. No other commercial passenger flying craft in the country has ever attained such a record as this, and so far as is known her achievements are unsurpassed by any foreign craft.

In commenting on this flight, C. F. Redden, President of the Aeromarine Airways, remarked: "How wonderful the flight of the *Santa Maria* really is can be judged from a comparison with the performances of other forms of transportation. During her flight the *Santa Maria* has never been inside a hangar; she has spent every night of her trip at anchor on the surface of some body of water, either the sea, a lake, or a river. A railroad locomotive has to be taken into its roundhouse and overhauled at the end of each trip; an automobile receives similar attention in its garage.

FAR FROM THE MADDING CROWD



One of the many picturesque spots for which New South Wales is famous.

WORDS OF WISDOM

If you wish your boy or pupil to be a gentleman, treat him as one and be one yourself.

Happiness is not the end of life! Character is.

The fellow who can be late when his own interests are at stake is pretty sure to be late when yours are.

Aggressive fighting for the right is the greatest sport in the world.—Roosevelt.

The busy man has few idle visitors; to the boiling pot the flies come not.—Benjamin Franklin.

Never make a decision when you are down-hearted. Never let the weak side of your nature take control.

SOLVING TRAFFIC PROBLEMS

DETAILS OF A GREAT UNDERTAKING

HOW SYDNEY WILL BE CONVERTED INTO A MODERN CITY

By **J. J. C. BRADFIELD, M.E., M.Inst.C.E.,**
Chief Engineer, Metropolitan Railway Construction Branch, New South Wales
(Special to "Sea, Land and Air." All rights reserved.)



The Town Hall Station will be one of the busiest centres in Sydney when the city railway is built. The entrances to the underground station are shown opposite the Town Hall, and on the left and right hand sides. Note the improvement effected by removing the iron railings.

CENTRAL Station, the *Alpha* and *Omega* of the railway system of New South Wales was opened for traffic in 1855.

As Sydney grew in population and importance, the city proper, a peninsula two and a quarter miles long by half a mile wide, gradually became too valuable for residential purposes; developing instead into the commercial, amusement and monetary centre we see to-day. The residential population proper has almost disappeared, although it is still in evidence along Macquarie Street and on the Rocks area; but for the most part it consists of travellers at hotels and the hotel staff, civic officials, caretakers at various mercantile buildings and the occupants of flats. There is a concentrated daily influx of popula-

tion from the suburbs for one and a half to two hours each morning, and a similar efflux each evening, whilst during the remainder of the day until past midnight there is a less concentrated but steady traffic.

The development of any area is best indicated by the increase in its unimproved capital value. In 1901 the unimproved capital value of the City of Sydney was £20,207,812, in 1911 £23,940,030, and in 1921, notwithstanding the war, £35,887,376. For the last ten years the unimproved capital value has increased at the rate of 4.19 per cent. per annum. The thought arises, can these unimproved capital values continue to increase, or has property reached its maximum in the city? The invention of the tall steel frame building has

made it possible for the land values to continue to increase, and for owners to obtain an increased return for their property. The credit of inventing the steel frame building belongs to Paxton of England. The first to be erected was the Crystal Palace Exhibition Building of 1851, a steel cage with outer walls of glass, hence its name.

The commercial value of this type of building is revealed by taking as an example a block of land in George Street, fifty feet frontage and one hundred feet deep, costing £800 per foot, or £40,000 in all. If a ten-storied building is erected thereon instead of a four-storied one, which is about the present average height of buildings in Sydney, the cost per floor for land is reduced from £10,000 to £4,000, whilst a twenty-storied building reduces the cost for land to £2,000 per floor.

The steel frame building has another advantage. It is a steel cage with thin curtain walls instead of the regulation thick brick or masonry walls, hence in a ten-floor building twenty additional offices, about fourteen feet by twelve feet, can be obtained owing to the thinner walls, and in a twenty-floor building forty additional offices.

The same commercial revolution, due to the erection of tall modern buildings, which has taken place in other cities, will, and is now, taking place in Sydney. Land values will continue to increase as must also the day population to inhabit these buildings. To-day nearly one million people are settled between Botany Bay and Broken Bay—thirty years hence this number will have almost trebled.

Central Station, the present stub terminal of the New South Wales railway system, aggregating on June 30, 1921, some five thousand and forty-three miles of railway, is situated about a mile from the business centre of the city, and one and a half miles from the water-front at Circular Quay, where a very extensive ferry service is accommodated.

The tram traffic on the streets has now reached a stage where it is impossible to accommodate all who wish to travel. This applies particularly between the Quay and Central Railway Station, and as time goes on the position will be intensified.

The suburban railways now terminating at Central Station, four up and four down tracks, serve an area embracing the western, north-western, south-western and southern

suburbs. During the evening rush period sixty trains, mostly of ten cars, depart from this station, the traffic being handled at twenty-one platforms. To improve the traffic facilities, these existing suburban railways are to be electrified, and extended into and around the city, forming a city loop, from which railways will lead to the eastern and western suburbs at present served by surface cars only. The Milson's Point to Hornsby line, now terminating at Milson's Point on the northern side of the Harbour, will be connected to the city loop at Wynyard Square by means of a cantilever bridge spanning the Harbour in one clear span of one thousand six hundred feet, and accommodating railway, vehicular, automobile and pedestrian traffic.

When the scheme is completed, the suburban steam railways now terminating at Central Station on the city side and Milson's Point Station on the northern side will be electrified, and the passengers brought into the city and distributed over four underground and two open-air stations on the city loop. In addition, much of the traffic at present conveyed into the city from the eastern and western suburbs by street cars, will be handled by electric trains having direct communication with the city loop, and it will be possible for passengers from all these suburbs to reach the heart of the city without changing trains.

Rapid transit electric railways, whether above or below ground, are expensive to construct, maintain and operate. The real measure of efficiency is the number of trains per hour which can operate on the railway during the morning and evening rush hour periods. The average cost of the city railway, as located, will approximate £300,000 per mile of single track, whilst the cost of the wholly underground location as recommended by the Royal Commission in 1909 would have been £400,000 per mile, both based on present day estimates. On the railway, as designed, thirty-six trains per hour can traverse the city, the maximum station stop being taken at forty seconds; whilst with the wholly underground location only thirty trains per hour could have operated, so the efficiency of the one over the other is manifest. The easier grades, and fly-over crossings everywhere, will enable this greater efficiency to be obtained.

Having determined the grades and final location, the train capacity of the railway is then fixed by three principal independent factors:

(1) The length of station stop; (2) the passenger capacity of trains; (3) the speed of trains, which determines the number that can operate along a single track in a given time, though under certain circumstances the speed is not independent of the station stop.

The station stop is controlled by the design of the car and platforms; the arrangement of stairways, passages or other means of access to and from the platforms, the ticket barriers, and the facilities for obtaining information regarding the destination of trains arriving at and departing from the station. The principal effect of car design, on limiting duration of station stop, is due to the arrangement of doors. For rapid movement of passengers, the platforms must be constructed so that travellers can enter, or alight from, cars without more than ordinary need for caution, which prohibits the use of steps or any undue space between the car and the platform edge. The platforms must be free from obstructions as far as possible, and the stairways and passages so constructed and lighted as to facilitate the free, safe and rapid movements of those using them.

In addition to stairs and ramped passages, lifts and escalators have been extensively adopted in other countries to facilitate rapid movement of passengers in stations. The escalator or moving staircase is comparatively new, but is rapidly displacing lifts owing to its greater capacity and efficiency. The escalators at Oxford Circus, London, have a vertical rise of sixty feet, and are the deepest in the world.

An estimate of the duration of station stop can only be made by observation and deduction after allowing for controlling conditions, to something in excess of the at the busiest station on the city railway under worst traffic conditions will not exceed forty seconds.

The passenger capacity of trains depends on the design of cars and the maximum train length. For steam traffic or under conditions where the station stop need not be limited, a car of the type now in general use for suburban traffic in New South Wales, with a platform and door at each end, a centre aisle, and seats arranged each for two persons is a good vehicle. For

rapid transit electric railways, however, it is unsuitable owing to the distance which passengers in the middle of the car have to travel to the doors, and the fact that their progress is frequently hindered by others standing in the narrow aisle.

One of the most recent rapid transit cars is that on the New York Municipal Railways with a normal seating capacity of ninety. This car possesses large seating capacity, easy access to doors of great width, and ample standing room. Conditions in New York are very different to those in Sydney, and the overcrowding that takes place in the trains of the New York subway would not be tolerated here. These cars, now in service in New York, are actually carrying more than the two hundred and seventy passengers for which they were designed.

The car adopted for Sydney has a similar seating capacity with less standing room than the New York car, but with very easy access to doors. With the climatic conditions prevailing in Sydney, it would be impossible to allow of crowding such as the New York car is definitely designed to cater for. The number of cars per maximum train, with multiple unit stock, is only limited by the length of station platforms. Modern practice has been to provide a platform length of about five hundred to five hundred and fifty feet. The length of the metropolitan railway platforms has been fixed at five hundred and twenty feet, which provides for seven-car trains.

Speed, the third factor determining the capacity of a rapid transit railway, operates in a very complex manner. Contrary to general belief, an increase in running speed usually results in a decrease in capacity of the railway. The reason for the apparent paradox is that for safe running it is necessary to limit the distance between the rear end of one train and the head end of a following train under any conditions to something in excess of the distance required to stop the second locomotive.

Under modern rapid transit conditions it is not sufficient to place a signal beside the track, arrange for that signal to be at danger under certain conditions, and assume that a driver would always obey the signal and stop before reaching it. To obviate the risk of collision through a driver passing a signal, the automatic

train-stop has been evolved, and is in use on most rapid transit railways. It is a device controlled by the track signalling circuits, arranged so that when the signal adjacent to it is protecting a train in advance, a tripper arm is raised to engage and open a cock on the brake pipe of the train, should it pass the signal, thus causing an emergency application of the brakes, and also cutting off current from the motors.

From Wells Street, Redfern, the eight existing tracks will be continued citywards as the main line railway, whilst four tracks will branch off to Central Station to handle the long-distance steam trains. The main line tracks will continue to a new open-air station on the eastern side of the existing terminal station, having its passenger and baggage facilities inter-connected with the main terminal.

Between Wells Street and the new Central Station the trains will be routed. The four up and four down lines laid single track up and down alternately, will by means of fly-overs be grouped into four pairs of up and down tracks laid alternately in pairs; whilst on the city side of this station, the tracks of one up and one down pair will run together, and thence onwards six lines will be continued citywards, side by side, two up, two down, one up, one down, until Goulburn Street is reached. Here they diverge, two up and two down tracks, in pairs, being taken along the western side of the city to a station under George Street in front of the Town Hall.

Beyond the Town Hall Station one up and one down line will rise, whilst the other two will fall until Wynyard Square is reached. Here there is a two-level underground station—the upper level serving traffic to and from North Sydney; the lower level traffic on the city railway and from the eastern and western suburbs.

Arrangements will be made to terminate certain traffic from either direction at both levels, and separate arrival and departure platforms are provided for, as at the Church Street terminal of the Hudson and Manhattan railroad, New York.

From Wynyard Square the two upper level tracks and two additional tracks terminating at this station, will continue *via* the cantilever bridge of one thousand six hundred feet span to North Sydney and connect with the existing railway system there. The two low-level tracks curve to

the eastward, where the surface contours permit of their emergence as an overhead construction, and continue east on bridge and viaduct to a combined railway and ferry station at Circular Quay at the present ferry terminus. Between Wynyard Square and Circular Quay Stations the connection to the western suburbs is made by fly-overs, the railway passing under Darling Harbour to Balmain in a subway providing a minimum depth of water for shipping of fifty-five feet at low tide above the top of the subway.

Continuing east from Circular Quay Station on viaduct for six and a half chains, advantage is taken of a thirty-one-foot rise in surface level to again enter a tunnel under Macquarie Street, the tracks curving then to the south under the Botanical Gardens and Macquarie Street to St. James's Station and to Liverpool Street Station, between which two the connection to eastern suburbs is made by means of fly-overs. From Liverpool Street Station the two tracks curve to the west and to Campbell Street, where they join the two easternmost of the six parallel tracks before mentioned, and thus complete the two-track city loop.

The stations at Wynyard Square and St. James's provide for terminating trains as well as through traffic. The six stations on the city railway are approximately fifty chains apart, and separate entrances and exits have been provided so that the incoming and outgoing passengers never meet. The ramps and passages have been designed on the experience of New York to provide for thirty to thirty-five passengers per foot of width per minute without overcrowding; stairways, twenty passengers up, and eighteen down per foot of width per minute, and escalators ten thousand eight hundred passengers per hour.

To facilitate the exchange of passengers at Central and Town Hall Stations each island platform is served by a pair of tracks carrying traffic in the same direction.

Central Station providing for suburban electric trains only, will be a new structure above ground, east of the existing terminal, and will have four island platforms with a minimum capacity of two hundred and sixteen trains per hour. The assembly platform and ticket offices will be at street level in concourse subways at the northern and southern ends of the platforms, access to which will be by stairways.

Town Hall Station, located under George Street, the busiest thoroughfare in Sydney, will have two island platforms and a capacity of one hundred and forty-four trains per hour. Access from the streets will be by stairs and subways. The footpath on the eastern side of George Street will be widened and the principal entrances located on the widened footpath as shown by the picture.

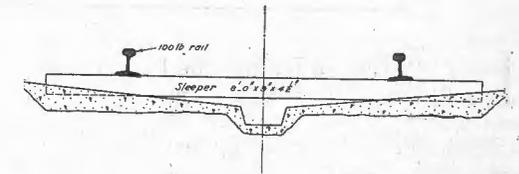
Wynyard Square Station under Wynyard Square Park is near the centre of the banking and wholesale business district, and being the junction for the North Sydney traffic will be a two-level station having a concourse floor between the two levels. Each level will have three island and two side platforms, the capacity of the station being two hundred and twenty trains per hour, including terminating lines. The station will be reached by three subways from adjoining streets, the main entrance being thirty feet wide.

Circular Quay Station is a combined ferry and railway station. It will have two side platforms and a capacity of seventy-two trains per hour. Access to platforms, twenty-eight feet above street level, will be by stairs and escalators. At the street level provision will be made for handling the traffic from the four main Harbour ferries, in addition to which, space will be provided for housing the various ferry offices, parcels office, shops, and a large restaurant, two hundred feet by seventy feet with a mezzanine gallery and roof garden, the rental value of which will be about £10,000 per annum. This building will be founded on iron and concrete caissons, sunk to rock, the depth varying from twenty to fifty-five feet below street surface.

The two remaining stations, St. James's and Liverpool Street, will also be equipped to handle traffic as expeditiously as possible.

Where the city railway passes under private property, the steel frame construction and roof of the subway will be designed to provide for warehouse buildings one hundred and fifty feet high being erected anywhere over the railway in the future. This is the maximum height allowed by the city building regulations, so there will be no blot on the title deeds of any property as to the height of the building which may be erected thereon, owing to the railway passing beneath.

To minimise the inevitable dust, the track will not be ballasted where underground. The sleepers will be laid on the concrete floor of the tunnel, a drain being formed in the concrete along the centre of each line under the sleepers, as shown. The elasticity and resilience of the sleepers will make the running easy, as they will not be bedded for their entire length on the rigid concrete floor, and the drain will enable the subways to be hosed



Showing the arrangement of the sleepers underground to provide for easy riding and to enable the subways to be hosed down and dust washed away.

down and the dust washed away. This hosing will reduce the dust and cool the subways. Where above ground the railways will, of course, be ballasted. Rails weighing one hundred pounds per yard will be laid throughout, and all curves will have double guard rails.

Electricity to operate the trains (direct current at one thousand five hundred volts) will be supplied to the train pantographs from overhead construction.

The soil from the railway will be used to fill in the head of Darling Harbour as far as Bathurst Street, and twenty-three acres of land so reclaimed will be added to the railway goods yard. Bathurst Street will be continued across the reclamation ninety feet wide, and will connect with Pyrmont Bridge Road and Johnston's Bay. When the reclamation is completed Pyrmont Bridge will be removed, and the wharves in the vicinity rearranged.

Work was commenced in June, 1916, being carried out by contract under the control of the writer. On January 1, 1917, legislation was passed constituting the Railway Commissioners the constructing authority for all railways. Work proceeded until June, 1918, when the then Government suspended operations, and most of the plant was dismantled and sold. The estimated cost of the work is now £4,500,000.

TAMING THE HEAD-HUNTERS

EXCITING EXPERIENCES IN BRITISH NORTH BORNEO

By A. R. DUNLOP*

In this article Mr. Dunlop, who occupied the position of magistrate in charge of the Labuk and Sugut district, British North Borneo, tells of his exciting experiences when leading an expedition into the rugged country of the interior to punish a tribe of head-hunting Dyaks.—ED.

LATE one evening about three months after I had taken up the position of Magistrate a Sulu arrived at the village with the information that while he and four companions were on a trading expedition into the interior, two of the party, while rafting rattans down stream, had been set upon by a mob of Suhn-Dyaks. One was killed and the other severely wounded. The Sulu declared that there had been no quarrelling or ill-feeling between the two parties to justify the attack—it appeared that the Dyaks were on a head-hunting expedition, and the Sulu's party had the misfortune to be chosen as the victims. Questioned regarding the wounded man, the Sulu explained that he was too ill to bring along. He had only escaped death by throwing himself into the river.

I sat up late that night taking down in writing the Sulu's statement, making inquiries and gathering information regarding the village and people who, according to the Sulu, had committed the crime.

Having prepared my report I proceeded to Sandakan and laid it before the Governor, with the result that I was given orders to effect the arrest of the chief and punish the people who were responsible for the outrage. Ten military police were detailed to accompany me, the men selected being Dyaks from the neighbouring State of Sarawak. They were armed with Snider carbines, ten rounds of ball cartridge being issued to each man.

With this small force I returned to the Sugut.

For the journey up-river I secured a large native-built trading boat. It was made from the hollowed-out trunk of a great forest tree, some forty feet in length and cunningly built up from planks, a

palm-leaf awning stretching from stem to stern.

The boat was propelled by oars working in rattan rings fastened to the awning stanchions. The Dyak police formed the crew. Two sat in the stern and did the steering, one with a rough rudder lashed to the side, the other using a long-bladed paddle. In front of them was the part reserved for the passenger, and all the forward part was occupied by the crew.

Corporal Balang, the N.C.O. in charge, was unusually tall and muscular for a Dyak, and the men were all sturdy fellows, very likeable, always cheery, and ready to make the best of any situation. In addition to the police I had engaged a Sarawak Malay, who had been trading for many years in the interior and could speak the different dialects, to act as interpreter. With my Malay servant and myself we made a party of thirteen—an unlucky number, but I do not think the fact occurred to me at the time. I was young and very proud of my mission, looking forward with pleasant anticipation to the possibility of adventure as well as to the interest of seeing and exploring new country.

It was anticipated that it would take us nine days to reach the Suhn-Dyak village, provided that we were not delayed by rain and flooded rivers.

All the preparations having been completed we made an early start from Trusan, and, with the help of a flowing tide, made good progress, stopping the first night at a tobacco estate.

Next day we had little tide to help us, but also little current to contend with. About four in the afternoon we tied up to the bank and the men got to work preparing a camp for the night.

We resumed our journey at an early hour next morning, the river flowing through flat, uninteresting country, the

only break in the monotony being occasional shots at crocodiles basking on the banks. About midday one of the Dyaks went down with a sharp attack of fever.

As we did not find a good place to camp on the river bank that evening we all had to sleep in the boat.

It must have been the small hours of the morning when I was awakened by the wild rocking of the boat and the angry cries of the men in the forepart, who seemed to be indulging in a free fight.

It was pitch dark. I scrambled out of my mosquito curtain and stumbled forward, striking a match as I did so. The moment the match flared, I was sprung upon and seized by the throat. I had just time, before the match went out, to see that my assailant was the sick Dyak. I grappled with him, and, the other Dyaks assisting, we got him down. His body was burning hot and he was in a raging delirium; it took four men all their time to hold him down. Having lighted a lantern I mixed a strong dose of Eno's Fruit Salts, into which I squeezed the juice of a fresh lime, and after some difficulty got him to swallow it. By the morning he appeared to have quite recovered, had his breakfast, and bathed in the river with the rest of us. While he was bathing I noticed that his back was covered with small vivid spots.

About midday the Dyak again developed a temperature, so, as we were passing the last of the tobacco plantations, I stopped and arranged with the Dutch manager to take him into his hospital, and allowed the police to have their midday meal before proceeding on our journey.

That afternoon the country began to change and the flat plains gave way to undulating hills. About four in the afternoon we came to the first *karangan*, or rapid, on both sides of which were broad banks of shingle, on one of which we made our camp for the night.

A short way above the *karangan* was a small native village, the first we had seen since leaving Trusan. The old chief came down to see me and was soon followed by all the villagers, bringing fruit, sugar-cane, sweet potatoes, and water melons, which they exchanged with the police for matches, tobacco, and salt.

These people were known as the Orang Sungei, or river people, and are to be found on all the North Borneo rivers, occu-

pying the part that lies between the sea and the mountains. They are essentially lazy, their morals are slack, and all are hopelessly in debt to the traders; yet, in spite of it all, they are always cheerful and free from care.

A short journey the next day brought us to the largest and most important village on the river. It was situated at the junction of a tributary with the Sugut, and was the principal settlement of the river people. The chief took me up to his house, quite a large and well-built one. I found him a very interesting old fellow, his darker skin and greater stature showing that he was not a native of the country. As we were approaching a part of the river that was much broken up by rapids and cataracts it became necessary to leave our heavy traders' boat here and do the next stage in smaller craft.

The large boat having been hauled up on the bank out of the reach of floods, our possessions were transferred to four small dug-outs, each capable of holding three men and a small amount of cargo. In these we once more set forth. The aspect of the country had now changed and there was always something to catch our interest. That day we passed many clearings, with native houses perched on the river banks.

On the second day the clearings came to an end and we were back again in wild country covered with dense virgin forest. Great hills rose on either side, rapids became more frequent and cataracts often barred our way, necessitating the unloading and hauling of our boats over or around them.

By carrying on until late in the evening we came, on the third day, to a large clearing situated below where the Sugut divided into two streams of about equal size. The clearing was occupied by a number of shacks which were inhabited by a colony of traders—Chinese, Malays, and Sulus—while large stacks of rattan and other jungle produce proclaimed the nature of the settlement.

Our arrival created quite a sensation, the traders swarming down to meet us. They had evidently been suffering from a bad attack of nerves—seeing head-hunters in every shadow—and made no attempt to conceal their relief at the sight of the armed police.

I took possession of the largest shack, sitting up late that night and spending the

* In *The Wide World*.

greater part of the next day listening to their tales and complaints. The Chinese, I found, were quite honest traders, devoting themselves to their business, avoiding disputes, and accommodating themselves in a wonderful way to their environment. The Malays were much the same, except that they were inclined to devote more time to the fair sex than to their trade. The Sulus were different; looking down with disdain upon the simple native, they were both bullying and quarrelsome. They clamoured loudly for revenge upon the Suhn-Dyaks for the death of their comrade—the wounded man it appeared, had died the day after their messenger had left for the coast. I sympathised with them in this, but when they showed that they were mostly concerned in obtaining loot I made it quite clear to them that the punishment of the Suhn-Dyaks, whether severe or otherwise, would depend upon the treatment they had received from the traders.

The last part of our journey had to be made on foot; so our boats were hauled up on the bank beyond flood level, and our possessions, which were very few, divided up into loads, which the police carried strapped on their backs.

It was a great relief to get away from the boats, and to be able to stretch our legs again. We made the usual early start, and after about six hours of stiff marching, during which we had to cross and recross the river about seventeen times, with the water breast deep, we reached the village of Tagupil, the last settlement of the river people. Beyond this was the country of the Dusans, or, as they were locally called, the Suhn-Dyaks; and now the serious part of the expedition commenced.

Tagupil was a very picturesque village situated in a valley, with the Sugut, now a stream which could be forded at almost any point, flowing through the centre, and the great mountain of Kinabalu towering in the near distance. The chief was a middle-aged man, very courteous and anxious to do all in his power for our comfort as well as to assist us in every possible way. Living on the outskirts of the Suhn-Dyak country, and many of his people having intermarried with them, he knew them intimately. From him I gained the first really reliable information.

The Suhn-Dyaks, he told me, were in a state of great unrest; they anticipated an attack from the traders as a reprisal for

the death of the Sulu. They had stopped all trading, and on several occasions small parties in full war-dress had been seen in the vicinity, evidently on the look-out for any hostile movement. I asked the chief if he could get into communication with the Suhn-Dyaks and persuade them to hand over the men who had actually committed the crime. He assured me it was impossible; the whole village was implicated. It was not a large one, containing not more than forty fighting men. He did not think they would offer armed resistance to us, but would probably take to the jungle with their women and children and remain in hiding until we had returned to the coast. The village was an easy six hours' march from here, and our presence would soon be known and a close watch kept on our movements.

It was apparent that no time must be lost, and through the chief a villager was obtained to act as guide, on condition that when in the vicinity of the Suhn-Dyak clearing he would be allowed to return.

I decided to move out that night, timing our departure so as to arrive at our destination not later than sunrise next day.

That evening I had a pow-wow with my men, impressing upon them the necessity of self-restraint and strict obedience to orders. After the pow-wow I told Corporal Balang what the orders were.

Great care was taken not to arouse any suspicion. The evening meal was prepared as usual, except that sufficient rice was cooked to supply us with a cold feed next morning. About 9 p.m. I called up the chief and told him that I wanted the guide. When the latter appeared he showed a strong disinclination to leave his comfortable hut, but once he had made up his mind that he was in for it he behaved very well. Warning the chief that he must not allow any of his people to leave the village until I returned, we set out at 9.30 p.m. and in a few minutes were buried in the inky darkness of the jungle.

We had to follow a track that necessitated marching in single file. Even at midday in a tropical forest there is a certain amount of gloom, and at night the darkness is intense.

A native path is really a tunnel cut through the thick vegetation, and is continually bending and twisting as it threads its way among the great trees, the roots of which spread across it and necessitate care-

ful walking, even when it is possible to see them. In the dark, progress was slow and painful—a constant tripping over roots, slipping down steep inclines, struggling up steep banks, and stumbling among slippery boulders in the many small creeks that crossed our path. We were quite unable to see where to place our feet, the only guide to direction being the noise of the man moving in front. By midnight I was tired, weary, and sore, and every moment the going was becoming more difficult. The guide was afraid that the path, as it approached the head-hunters' village, might be guarded or protected by traps, so he left it, and we had now to force our way through the trackless tangle of the jungle. Only those who have experienced it can imagine what *that* means! My face and hands were soon covered with scratches, my shins barked and bruised. The care that had to be exercised, the caution with which every move had to be made, the endeavour to protect one's face and eyes from invisible obstacles, the unending disentangling of oneself from thorn-covered creepers, put a strain on every fibre of the body.

Hour after hour we struggled on. The night seemed unending. I became thoroughly exhausted, and had been fighting for some time against the feeling that I must give in and call a halt until daylight came, when, to my utter relief, I noticed that slight patches of grey were discernible overhead, and realised that it was the sky showing through the tree tops. Day was dawning! There is little twilight in the tropics, and in a few minutes the darkness had dissolved. Just when everything had developed into definite shapes the guide stopped and, holding up his hand, said "Listen!" Even as he spoke, distinct and unmistakable, we heard the crowing of a cock. I turned to the direction from which the sound came and then looked back at the guide, but he had gone, only a slight rustling in the jungle indicating the direction of his flight.

A small stream trickled past where we stood, and seating ourselves on its bank we washed the perspiration from our faces, munched some cold rice, and took long refreshing draughts of the cold, clear mountain water. We did not stay long, however.

Many cocks were now crowing, and soon the village women would be up and about, preparing the morning meal for their men. Balang led and I followed, with the men

trailing behind. We soon struck a large well-used track which we followed, taking care to keep just within the bush as a precaution against the possibility of traps having been set. In a brief quarter of an hour we found ourselves in a fair-sized clearing, in the middle of which stood a cluster of about a dozen native houses.

A hurried glance was sufficient to show us that the people were not yet astir. Slipping past the outlying buildings, we made for the one that looked most pretentious. They were all made so that the floor was raised about five feet above the ground. The one we made for had a small platform, or verandah, built outside the main entrance. As we drew up in front of this the flap that answered for a door was opened, and a frowsy-looking middle-aged woman appeared in the opening. Rubbing her eyes and yawning heavily, it was several seconds before she realised that strangers were watching her. Then, with staring eyes and open mouth, she gazed at us stupefied and terror-stricken, until, reason returning, she disappeared, slamming the door behind her. A short silence followed, broken by the stamping of feet and the creaking of the floor as the inhabitants were hurriedly aroused. I spread my men across the front of the house and gave orders that the women were not to be interfered with, but that no men were to be allowed to escape.

Suddenly the door flew open and there burst forth a stream of women and children. Some sprang lightly to the ground, several were pushed off and fell, and those who could swarmed down the corner posts. Some dragged children after them, others carried babies in their arms. In less time than it takes to tell all had scampered across the clearing and taken shelter in the surrounding bush.

Now that the women were away trouble might be anticipated. Anxiously I waited, but everything remained silent.

Through the interpreter I called upon the chief to come out, and almost immediately a sturdy old man stepped out and, descending from the platform, came up to me. He was naked except for a *chawat*, or narrow waist cloth, the ends of which hung down in front and behind; two broad bands were tattooed up each side of his chest to the shoulders and then down each arm to the wrists. His long hair was tied up in a dark head-cloth. He wore a long sword slung from his shoulder which Bal-

ang unceremoniously removed, the old man showing no resentment. In a steady voice he asked what I wanted. I made the interpreter explain that we had come to arrest the murderers of the Sulu traders, and that, as he had been accused of taking the leading part, he would have to accompany me back to Tagupil, where an inquiry would be held. The chief strongly resented the accusation and denied all knowledge of the crime.

While we were talking the inmates of the other houses had hurriedly made off into the bush. The chief was told to call out all the men remaining in his house and to warn them not to bring any weapons. He did so, and a dozen lusty fellows, clothed in *chawats* only, obeyed, looking very sulky, and squatted down on their hams behind their chief. I now told him that they must come with me and that I intended starting back at once. At this the chief demurred, saying that he was of a different people to the river tribes and could not understand why he should go to their village. I explained that I represented the Government, and that my headquarters were for the time being at Tagupil. He replied that he knew the Sultan of Brunei as the Big Chief, but of the *orang puteh* (white men) he knew nothing; they came from the great salt water and were a strange people who had no knowledge of the mountain tribes or of their customs.

I pointed out that the *orang puteh* had received from the Sultan the right to govern the country.

"But we are not slaves to be given away or sold," he retorted.

"You are an old man," I said. "You are chief of this village because you are supposed to be wiser than your followers. You are accused of killing the Sulu traders. If the Sultan were ruling now, what would happen? The Sulus would not wait for the Sultan's authority, but would collect from every part of the country and attack your village. You could not withstand them. Your village would be destroyed, many of your people would be killed, and all your property carried off. The *orang puteh* do not allow that. You must accompany me to Tagupil, where I will listen to all you have to say and hear any witnesses you wish to bring."

When this had been interpreted to him the old man considered for a few moments,

then, looking round at my men with a smile, said: "You are armed with rifles. What can I do?"

At this moment Balang interrupted: "Listen, *tuan*," he said. "Don't you hear it?"

In the distance I heard the rumbling of a violently beaten gong. For a moment I did not realise what it meant, then it dawned upon me. It was the native alarm, a call to arms! As we listened another started, then another, and soon from a dozen or more different points the call was being sent forth. The whole country was being alarmed!

Turning to the chief, I told the interpreter to impress upon him that if he had it in his power he had better take steps to prevent any act of hostility against us, and that I intended to hold him as a hostage. When the interpreter, in forceful language, had explained what I said, the old man turned to his followers and gave them some orders, upon receiving which they got up and, moving off, disappeared into the bush.

"Now," I said to the chief, "you have got to come with us."

"I am hungry; I want to eat first," he told me, appealingly.

I was anxious that he should come willingly, so in spite of the fact that he was evidently marking time I gave him permission to eat, on condition that he was quick about it. After several calls by the chief there trotted out into a clearing a weird little old woman who, looking very cross and mumbling angrily to herself, disappeared into the house.

When the ancient dame announced that the food was ready I accompanied the old man into his house, followed by Corporal Balang and the interpreter. A huge meal of rice, in which were mixed field mice, squirrels, and small birds, was set before the chief, who promptly began to demolish it.

The house, which was about one hundred feet in length, was divided down the centre by a broad passage. On one side of this was a *balli-balli*, or raised platform, running the length of the house; the other side of the passage was divided into cubicles, the sleeping quarters of the married people. There were no walls at the side of the building, the roof coming down to and slightly below the floor.

What most excited my curiosity was the sight of about twenty human heads hanging from the ridge-pole in the apex of the roof. It was obvious that the majority had been there for many years and none were of very recent acquisition.

The old man soon finished his food, and was cleaning his hands by the simple method of rubbing them on his legs about the interpreter, who had been prying about in the cubicles, called out in Malay, "*Tuan*, here is proof of recent head-hunting!" He came forward, holding in his hand what looked like a native bird-cage decorated with stringers of dried *aspidistra* leaves, and in which lay what was unquestionably part of a human skull and fairly fresh.

The chief suddenly became very voluble, he and the interpreter entering upon a heated argument. I interposed, whereupon the indignant interpreter explained that the chief wanted to make out that it was part of a monkey's skull. "You can see plenty of monkeys' skulls," he said, pointing to the rafters of the sloping roof, which were decorated with many trophies of the chase, "but none of them are treated like this."

"But why," I asked, "is there only part of the skull when the whole head was taken?"

"It has been divided up among all who took part," explained the corporal, "so that they will be equally implicated."

The chief, evidently recognising that the game was up, became defiant and truculent, and I told the corporal to arrest him. An attempt to resist was of no avail against the bulk and sinew of the Dyak, who quickly had him outside the house. Although trembling with rage, the old man made a brave effort to control himself, and asked through the interpreter if it was my intention to kill him to do so quickly.

At this moment the corporal, his eyes shining with excitement, called out: "Be on your guard, *tuan*; the jungle is full of armed people." I looked round, and, sure enough, figures armed with spears could be seen moving excitedly to and fro, just inside the edge of the jungle. Even as I looked, one warrior, with a wild cry, sprang out and made towards us. His head was encased in a rattan helmet decorated with the tail feathers of the pheasant, a fighting jacket of deerskin hung from his shoulders, a round shield carried on his left fore-

arm protected his body, while he waved a spear in his right hand. Bravely he came on for a few strides until, seeing the police bring their carbines to their shoulders, he turned and darted back to the cover of the trees. It was a critical moment. Had he continued to advance others would have almost certainly followed and a fight would have ensued.

The interpreter, who had plenty of pluck, begged me to kill the chief. "Then we can fight our way out," he added. "Some will escape; if not it is *nasib* (fate)."

When he heard this Balang sprang forward. "I will shoot him," he cried, and, cocking his carbine, thrust the muzzle to within about three inches of the chief's face. Throwing up the muzzle, I told him to wait for orders.

The jungle was now ringing with the cries of the warriors, who seemed to be working themselves into a frenzy, now darting into the open, now flying for shelter from the pointed rifles of the police.

My men behaved splendidly. So long as we remained in the open I had no fear, feeling that with our firearms we were more than a match for these people, but what I had to face was the fact that when we left the clearing and entered the forest we should be at a tremendous disadvantage. In the dense vegetation the natives, unseen, would be able to approach close enough to make deadly use of their throwing-spears.

I told the Chief that he must now come with us and impressed upon him that if so much as one spear were thrown at us when we entered the forest he would immediately be shot. By way of answer he deliberately squatted down on his haunches. Calling up two police, I told them to bring him along, at the same time telling the others to close up on either side. The two Dyaks seizing him by the wrists, dragged him to his feet. He commenced to struggle violently, and the warriors in the bush became frenzied. The noise they made was appalling, but they still kept close to the cover of the trees. Possibly they were waiting for their opportunity when we left the clearing and entered the jungle.

Had we been unencumbered it would have been bad enough, but to have to defend ourselves and at the same time drag along a struggling prisoner gave occasion for serious thinking. I was determined,

come what might, that I would take the chief with me, as it would be fatal to my future authority if I failed.

We had proceeded about half-way to where the path entered the jungle when the chief, in his struggles, either hurt or so annoyed one of the Dyaks that the latter lost control of himself. Dropping his rifle he drew his sword and, springing upon the chief, seized him by the hair and threw him heavily to the ground. Then, giving his Dyak war-cry, he swung his sword in the air. Only just in time I grasped his arm. Very sullenly, glaring at the prostrate chief meanwhile, he obeyed my order to sheathe his sword and pick up his rifle.

The chief's face was a ghastly grey colour as, trembling in every limb, he slowly arose from the ground. Thrusting out his hands with a gesture of appeal he said, "I will come."

He had gazed composedly down the muzzle when a rifle was pointed at his head, but the sudden temper of the Dyak policeman, the pain and indignity of being thrown to the ground, and the flash of the heavy Dyak sword, had brought fear. He had seen imminent death in a form he understood, and through his mind had probably flashed a vision of his severed head being carried off by these strange people who had so suddenly invaded his village. He had seen death and the greatest disgrace his mind could conjure up, and he was afraid.

Trembling and subdued, he stepped out with us.

As we entered the bush I admonished my men to keep close up but not to get bunched together. The yelling hillmen were on both sides and unpleasantly close to us. They had seen the chief thrown down and the sword flash over his head. They had seen me stop the blow and the chief arise and voluntarily move off with us. They could not understand it. The suddenness of our arrival, the steady, self-reliant way in which the police behaved, the lack of noise and excitement on our part, puzzled and impressed them. Nothing could have been easier than for them to close in on either side where, from the cover of the vegetation, they could have attacked us with little risk to themselves; yet they did not, but like a pack of pariah dogs round a savage

old bear, they swarmed around us, shouting and howling, but always just out of sight.

For an hour or more, during which time we were able to appreciate the feelings of a hunted animal, we continued our march, until we came to a small deserted clearing in which were the remains of two native houses. The sun had now commenced its descent in the west, the heat was terrific, and, as a creek of clear water traversed the clearing I called a halt, and at Corporal Balang's request gave the men permission to finish their ration of rice. Squatting on the bank of the creek they were soon munching away, the old chief in their midst, and every man with his loaded carbine ready to his hand. I sat down close by in the shade of one of the rotting houses, keeping an anxious eye on the surrounding jungle, getting an occasional glimpse of a dark figure as it moved stealthily among the bushes.

Suddenly a movement on the part of the prisoner attracted my attention; he had risen to his feet and was talking to the interpreter. The old man was smiling, and when the chief finished speaking the interpreter also grinned, and together they came up to me. The chief, reaching out, took my wrist, turned the palm of my hand upwards and rubbed a few grains of rice on it.

"What is the meaning of this?" I asked.

"All is well now," replied the interpreter, "your men shared some of their rice with the chief; he accepted it and in turn has just shared it with you. You have now eaten together, and he has partaken of your hospitality. He will now do whatever you want, and there will be no more trouble."

"Although unable to understand a word, the chief smiled and nodded. I smiled back at him, upon which he threw back his head and gave vent to a series of long-drawn cries. The yelling in the jungle slowed down. Again the old man's voice rang out, and soon the jungle was silent. Shouting at the top of his voice, he harangued the hidden warriors. Once or twice questions were hurled back at him, to which he replied long and forcibly. Having finished, he squatted down in front of me. A few

minutes passed and then from the jungle there emerged about a dozen natives. Their fighting kit was gone and they were without weapons of any kind. I recognised some of them as from the chief's house. Squatting down beside him, they were soon chatting and laughing, and very evidently quizzing the old man on his recent experiences.

Once more we set out on our homeward march, but now the jungle was silent while the chief and his followers marched gaily in the middle of our party.

When within a short distance of Tagupil one of the Dyaks sat down, saying he had fever and could go no farther, but would follow on when he was rested. He could not be left, so his companions, and also the Suhn-Dyaks, took it in turns to help him along.

It was evening when we reached Tagupil. A dip in the cool waters of the Sugut, followed by a dinner of boiled chicken and sweet potatoes, refreshed and fortified me against the usual discussion of native affairs which followed and lasted well on into the night. I was very weary and ready for my rest when I was at last able to retire to the part of the house which had been partitioned off for my use. Entering, I was astonished to find the sick Dyak stretched out on my sleeping mat, his feet on my pillow and his head where my feet should have been. He was babbling incoherently and waving a naked sword in one hand. I saw that he was delirious, so, after gently taking the sword from his hand, I called in the corporal and had him removed to his own quarters, where, after giving him a cooling drink, I left him in charge of his companions.

My first duty next morning was to visit the sick man. I found him much better but very weak, and covered with spots similar to those I had seen on the man we had left at the plantation. The corporal reported that another man was down with a high temperature. I did what I could for them from my limited supply of medicine.

All that day I was busy going into the head-hunting charge against the Suhn-Dyaks. All the traders from the settlement down-stream were present. The Suhn-Dyaks made no further attempt at subterfuge, and quite dramatically recounted the whole affair. They told a long tale of bullying and bad faith on the part of the

Sulu traders, which was confirmed by both the Chinese and Malays.

Finding that there had been very great provocation, I ordered that, on the chief taking an oath of allegiance to the Government, the village should pay a fine, each male member forfeiting his fighting spear as a sign of submission. The chief accepted this and was allowed three days to prepare for the ceremony of taking the oath and bringing in the fine.

The following day another policeman was down with the fever, so I determined to send the three sick men to the coast. Going down-stream with the current, they should in three days reach the first tobacco plantation, where there was a hospital where they could receive proper attention, so a good dug-out was selected, and they were made comfortable under a palm-leaf awning, two men being detailed to do the paddling and look after them.

Of the ten men I had started out with only four now remained.

On the morning of the third day, the one on which the Suhn-Dyaks were due, the Tagupil chief rushed into my quarters.

"They are coming, tuan," he said; "my women who were collecting firewood in the jungle have seen them. There are many; they are all wearing their fighting kit and are all carrying many spears."

This was a shock. Were the Suhn-Dyaks going to be treacherous after all? They would, of course, know how few of us were now left. I told the corporal to get his men together and to be prepared for any emergency.

Soon the Suhn-Dyaks began to emerge from the bush. As the chief of the village had said, they were all in war-dress and each had an armful of throwing spears. They did not advance into the clearing, but clustered, about forty lusty warriors, close to the bush. It looked suspicious, but at the same time if they had intended to attack us openly they would most certainly have adopted different tactics. What I had to take precautions against was treachery.

Putting my revolver in my pocket, I told the interpreter to accompany me, at the same time giving the corporal instructions to remain concealed in the house and keep a sharp look-out, but to do nothing unless I was attacked, in which case he and his men were to immediately open fire. Accompanied by the interpreter, I descended and walked over to where the warriors were

bunched together on the outskirts of the jungle. As I approached they spread out into a long line about three deep. Choosing the man who looked largest and fiercest, I slapped him in a friendly way on the shoulder and, pointing to his spears, made a motion towards the ground. The interpreter explained my meaning. The head-hunters hesitated, looking from one to another. Trying to appear as unconcerned as possible, I took hold of my warrior's spears and quietly but firmly removed them from his grasp and threw them on the ground. One of them said something, and next moment they were all laughing and chattering as they threw down their spears into a small pile on the ground and removed their swords from their shoulders. While they were disarming the old chief made his appearance, riding a young water-buffalo bull and followed by half-a-dozen elderly individuals. He had no doubt been an interested spectator of the little episode. Had the police accompanied me and given them the opportunity of tackling us at close quarters they would probably have availed themselves of it, but they are much too cautious a people to take risks, and not seeing the police or knowing what precautions had been taken, they quickly decided that their best policy was to carry out the programme as arranged at the trial.

Calling up the chief of Tagupil, I had all the weapons removed to his house and preparations were then commenced for the ceremony of taking the oath. I had arranged with the people of Tagupil to supply us with several jars of *pengassi*, a kind of native beer made from fermented rice; these I now had ostentatiously carried out and placed in the shade of some fruit trees, their appearance being greeted with unrestrained exclamations of delight by the Suhn-Dyaks.

The wretched buffalo that had been the old chief's steed was thrown, and its legs securely bound together. Two large stones roughly rectangular in shape were procured from the river. With great care a spot was chosen in a prominent position and two holes made just deep enough to retain the stones in an upright position.

Everything being ready the ceremony was proceeded with. The old chief acted for his people, the interpreter for the Government. The chief led off. Squatting on the ground he struck it several times with the palm of his hand, accompanying each

blow with a long-drawn cry. "Oh, spirits of the earth!" he shouted. When he considered he had gained their attention he proceeded to explain that they were required to carry out the injunctions laid upon them by the people. If the Government failed in their pact with the hill people, the spirits were to see that the Government suffered extinction, its people would choke when eating, be drowned if they went on the water, or be crushed by falling trees if they entered the forest. Snakes would poison them, wild animals would slay them, and their women would die in childbirth.

When he had finished the interpreter took it up on behalf of the Government. It was simply a repetition of the chief's performance, except that the spirits were told how to deal suitably with the Suhn-Dyaks if they did not carry out their part of the contract that had been agreed upon. In the meantime the throat of the buffalo had been cut, the stones planted, and the blood of the buffalo, still hot, sprinkled over them. The carcass of the animal was apportioned, one half to the Government, the other to the Suhn-Dyaks, the chief of whom formally presented me with his half and I gave him mine. It was then cut up and divided generally among all present, and the ceremony was complete.

All through that night the natives, both river people and Suhn-Dyaks, squatted round small fires eating buffalo meat and drinking *pengassi*.

My mission was now ended, but my regular work as a District Officer kept me a few days longer at Tagupil, arranging for the systematic collection of poll-tax by the chiefs, explaining to them their powers and duties, and settling a number of small cases.

The return journey was without incident. Travelling with the current our small party soon reached the river people's settlement, where we again got into our large trader's boat. We were very short-handed, but both my "boy" and the interpreter took an oar, and progress was fast. On the same day that we transferred into it, shortly before sun-down, we reached the plantation where, on the way up-river, we had left the sick policeman. I landed and made my way to the manager's bungalow and, when nearing it, saw him come down the steps and hurry towards me. While still some distance off he called out "Stop,

stop!" Wondering what could be the matter, and considerably annoyed at this unusual and unexpected greeting, I waited until he came up.

"You must not come here," he cried in agitation; "you must not let your men land on the estate or go near my coolies!"

"What do you mean?" I asked, stupefied at this strange welcome from a man whose hospitality had always been unbounded. "I want to know what has become of the sick man I left with you."

"He is dead, he is dead—and now my coolies have got it!"

"Got what?"

"Do you mean to say you do not know?" he repeated. "Why, the man you left here had small-pox! Now the estate is infected, and God knows where it will stop!"

I was horrified. I turned and walked back to my boat, the manager walking with me and apologising for his inhospitality, but he was worried and anxious about his own men—Chinese and Japanese coolies—of whom he employed several hundred. He told me that the sick men I had sent down had tried to land at his estate, but he had ordered them off. He had thought that I knew what they were suffering from.

Stopping only for meals, I pressed on all that night and all the next day. When the men were tired and required a rest we let the boat drift with the current.

When we arrived at Trusan I found a letter from the Principal Medical Officer stating that there was an outbreak of small-pox at Trusan, proclaiming it an infected area, and ordering a strict quarantine. But that ghastly experience is "another story."

WHERE NATURE WEEPS



Much has been said and written of the beauties of Wentworth Falls, but the visitor, after examining the magnificent waterfalls and scenery, will agree that the charms of the district have not been overstated.

OVERSEAS AVIATION

Round the World in 480 Hours.

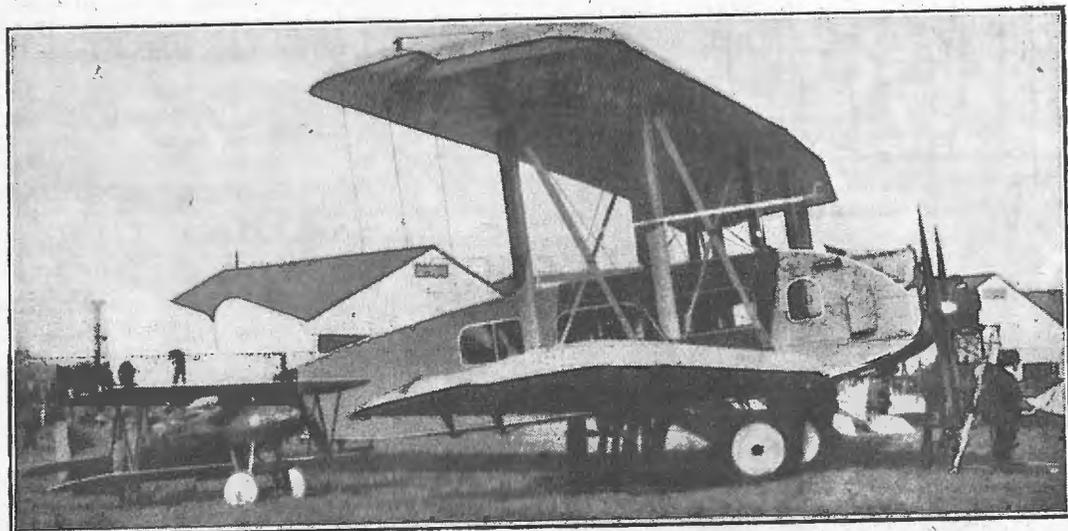
A rush round the world by air in four hundred and eighty hours, at a cost of £680. This is one of the possibilities of the near future. At the great "airway" congress now being organised in Paris, in conjunction with the Autumn Aero Show, an effort is to be made to join up missing links in the world air chain. Airway experts are now ready to specify the machines and map out the route. Leaving London at 8 a.m.

days puts Jules Verne's eighty days' trip sadly in the shade; also the sixty days which are reckoned for a continuous world journey to-day by land and sea.

New Aeroplane Propeller.

An announcement is made in *The Times* of the invention of an improved type of aeroplane propeller whereby engine power necessary for driving the aeroplane will be lessened and the vibration of the ma-

LARGEST AND SMALLEST PLANE IN AMERICA



["Wide World."]

This illustration shows the largest and smallest plane in America. The "Remington-Buranelli" has a wing spread of 77 feet, and accommodation for 34 passengers. The "Mummert Cootie" is a single-seater with a wing spread of but 15 feet. Both went up during the Aero Club's flying meet at Mineola recently. Bert Acosta, who piloted the "Cootie," did so in his stocking feet, explaining that he did not wish to overweight it.

on Monday morning, you are at Constantinople at 4 a.m. on Tuesday, and Cairo is reached at noon the same day. Then with a berth booked in an air leviathan, you go right through to Australia, reaching Sydney at 10 a.m. the following Tuesday. After this, taking the Pacific in another great air voyage, you are at San Francisco at 4 p.m. on Saturday afternoon. The next stage is by the trans-American route to New York, which is reached at 10 p.m. on Monday in time to take another air liner to London, where you glide down at 8 a.m. on Thursday morning. To do twenty-seven thousand miles in seventeen

chine will be much reduced. The new type of propeller arises from the addition of a number of "veins" or flanges made of aluminium to the existing type of propeller. These "veins" are about six inches in height, and run parallel across the surface of the propeller at a distance of about one foot from each other. There are eight at the drive side, four at each end of the blade, and six on the wind side in similar positions. It is claimed that by this arrangement the air is properly directed past the propeller blade faces, with the result that there is an avoidance of the air losses from the blade ends.

"NO CAN DO"

A BIT OF OLD CHINA

By LOUIS DE WOLF

FANG-LING stood in the rear of his jewellery shop, a dimly lighted square room lined on three sides with old-fashioned showcases, in the centre being a case that contained small pieces of carved ivory.

From the recess of the side case Ling could produce jade, amber beads and pieces of Chinese wrought jewellery that would hold the eye of an expert. He also dealt in and repaired watches and clocks. Fang Ling had an established reputation for reliability among the Europeans of Hong Kong, and his shop in Queens Road, where it merged into the native quarter, was patronised also by the well-to-do Chinese. His wares were genuine—that is to say, they were not spurious. One could buy from Ling a piece of jade of poor quality, but it would be, nevertheless, real jade. He had in stock beads of amber that were speckled and cloudy—also he possessed strings that were clear and rich in colour. True to his blood, Ling loved to bargain. To have a plainly marked fixed price and adhere to it would take the joy out of business for almost any Chinese, and Ling was not the exception.

To barter and to bargain had to Ling all the exhilaration of a game. He had been brought up in its atmosphere. Dealing in carved ivory, jade and amber beads was to Ling a sport. The problem was to have some one on the other side of the counter with whom to play the game of buyer against seller. For months there had been no game worth mentioning—no zest to the sport.

It was upon this clear, cool afternoon toward the end of January, when the winter season was nearing its height, that Fang Ling, dressed in the conventional long gray Chinese coat, stood in the rear of his shop very sober and very sad, for, indeed, business, the kind he liked, was and had been very, very bad. Ships had come and ships had gone—from America, from the Straits, up from Manila, from London, even from Australia—and if they had landed tourists

or travellers few had opened the door of his shop to make purchases.

Chang, the bean exporter, had told him that business was bad all around the world. His cousin Wong in Canton, who dealt in silk, confirmed the statement and added: "The foreign devils have spent all their easy made war money."

Beneath his imperturbable features Ling was that afternoon a depressed Chinaman. As he stood there wondering if the good Joss was going to allow him to save his face at the approaching New Year holidays, the door opened and in walked young Hawkes, connected with an import and trading company with head offices in San Francisco. Hawkes had the breezy air and self-assurance of an American who is successful, or at least one whose training has taught him to appear successful. He carried under his arm a round metal and copper wired object that looked at a glance like a large rat trap. He greeted the Chinaman familiarly: "Afternoon, Ling!"

"Morning, Mister!" returned Ling.

Hawkes the previous month had paid Ling \$1.50 to repair his watch, and so felt on terms of business familiarity.

"Have here just what you need, Ling, electric warmer. Attach him to light socket so. Turn switch. Plenty heat. No more fooling with brazier. All number one new. Sell him cheap—\$25 Mex."

In his enthusiasm in trying out his ability as salesman Hawkes had been talking fast and mixing straight with pidgin English. Business with his firm had also gone flat, hence the call upon Ling. To Ling the fact of any one, by such quick methods, trying to sell him anything would have been sufficient to bring a negative reply, and this day the most subtle method of approach would have been barren of result. Yet he looked at Hawkes in a half interested way, smiled, and with a touch of gentleness in his voice replied:

"No can do. Everything plenty damn bad."

Hawkes was not in the least set back. "You need him, Ling, these cool days. Makee shop nice and warm. Be a sport. What do you say?"

Again from Ling, with a smile, "No can do."

Hawkes stepped nearer to Ling.

"You don't understand, Mister Ling. It's a great invention. You need one to take the chill off the store in the morning. I'll tell you what I'll do. I'll put this in on ten days' free trial. All it will cost you is the juice. At the end of ten days you buy him for \$25, less one per cent. in thirty days. How's that, eh?"

Again from Ling, in a voice of more firmness: "No can do, please!"

Hawkes realised he had missed fire on Ling. "All right, Ling, but you are passing up a bargain. I'm going down the street to sell Charlie Fong." Hawkes had some tailoring done by Fong. "He some smart man. He knows a good thing. He'll buy him. So long." Out stepped Hawkes with this rat-trap looking affair under his arm and disappeared in the direction of the tailor.

Ling, standing against the rear counter, looking with an expressionless countenance toward the street, and whatever were his thoughts they were not upon electric heaters. In a few seconds he walked behind the counter to a small table, and, sitting upon a low stool, glanced over some accounts or memos, written in Chinese characters, and bound crudely together in book form.

He was sitting thus when again the shop door was opened and in walked a couple. Anyone would have guessed them Americans, and on a second hazard added bride and groom. The girl was perhaps twenty-six, good height, with hazel eyes, brown hair and round, red cheeks. Her sport suit of deep brown gave no indication of her figure. Her short skirt readily disclosed brown woollen hose set into a pair of well-fitting tan oxfords. But what would have caught the masculine eye was the snap with which she wore a brown sailor straw and a rich furpiece around her neck, caught snugly under the chin. She gave the impression of being all bundled up without impeding an easy swing of movement. She would have compelled attention from anyone that has an eye for youth and healthy beauty.

The man, her husband of three months, looked to be thirty-five or so. He was fairly good-looking, tall, rather thin of face, with black hair and dark eyes, and wore a brown-belted overcoat and a brown felt hat. They entered as if they were not sure of being in the right shop, and both were glancing around the store when Ling, rising from the stool, seemed to glide out from the shadows into the centre of the room, where he faced them with a smile. The American spoke:

"We have been recommended here by Mrs. Partridge, who says you are reliable to buy jade from. No cheat, you understand? Ling grinned broadly.

"Want look see jade?"

"Yes, we want look and if you make cheap price we will buy."

"All proper price," said Ling with a smile as he went behind the counter and began to hand out from the shadowy corners beneath the glass several pieces of carved jade. Nan felt of two. They were cold to the touch. That was one test. Then she examined a few closely for colour and excellence of carving. Ling leaned over the counter and pointing said:

"See bird?"

"Is this Fang Ling's?"

"Me number one man."

"Oh, yes. Look, Tom, see the bird's head carved there in the corner."

Nan was growing enthusiastic. She had a special fondness for jade.

"How much?" she asked Ling, holding the piece toward him. Ling looked closely at the characters on the tag and handing it back replied with a smile:

"Eighty-five dollars."

To Nan it was worth considerably more than that, according to Fifth Avenue standards. To Tom, who did not pretend to know values in a jewellery shop, it was worth whatever his bride cared to pay. He was not, however, so carried away as to fail to remember Mrs. Partridge's admonition on the ship that one would be foolish indeed to pay a Chinese his first asking price. So, although it went against his American spirit to haggle over the price of an article his wife was keen on having, he looked Ling directly in the eye and rather sharply said:

"Come, how cheap will you sell it?"

Ling smiled blandly and in a gentle voice said:

"Him very fine. Eighty-five dollars proper price."

Tom retorted: "We expect to make other purchases and you must make cheap price." Whereupon Nan spoke:

"Yes, we will probably buy other things. Show me, please, some amber beads."

Ling glided to another case and produced from the interior two long strings of amber beads. As Nan took one of them her face became animated. The beads were clear and rich in colour.

"Oh, Tom, these are lovely! Look at the colour. Ethel's don't compare with them." To Ling, "How much?"

Ling examined the tag and again the smile as he said: "Forty dollars."

Nan looked approvingly at Tom, whereupon he whispered to Nan, who nodded an assent.

Nan, who now was radiating the happy cheerfulness that so becomes a bride, cast a smiling glance at Tom and then, turning to Ling, said:

"Show me some ivory, please."

Ling at once went to the centre counter. Nan, looking through the glass, spied the ivory rikishas. Ling placed them on the top along with paper cutters, elephants, sampans and cigarette holders. Tom, examining a holder, inquired of Ling: "These are all real ivory, of course?"

"All proper," replied Ling.

At that moment the door opened and in bustled a short, rather stout, middle-aged woman, carrying a small parcel which she proceeded to unwrap as she entered. She created the impression of being either a fussy person or in a hurry. Her greeting to Ling confirmed the latter.

"Afternoon, Ling. Me muchee chop chop."

Ling bowed a temporary leave-taking to his prospective customers and walked over to Miss Tubbs, the missionary, who was ready to hand him the clock she had unwrapped. Ling took the clock as if he knew it was to be left for repair and waited resignedly for the complaint. Miss Tubbs without preliminary began:

"Last night roof top side make break. Rain come. Coilum tick tick. No can tell when make sing-song. Can fix chop chop?" To which Ling replied:

"Can fix proper three day." Miss Tubbs became earnest in her speech.

"No tick tick, no can tell when make sing-song. Must have chop chop."

To which Ling, smiling faintly, replied: "Can do two days."

Miss Tubbs, looking somewhat relieved, answered: "Maskee," and, turning to leave, said audibly, talking to herself:

"I'll have to borrow a clock from someone."

To this matter of fact drama Nan and Tom had been listeners—also they had again conversed in subdued tones. Finally Nan remarked:

"Just as you say, dear; only I would not want to miss our chance of buying them."

"Let's risk it," said Tom. "We can always come back."

Ling had rejoined them, and with that same smile upon his face—a smile that only an Oriental knows how to cultivate; a grin that is friendly and yet means nothing. Ling stood there, silent, waiting his patrons' pleasure, voicing no praise of his wares nor suggesting a purchase. Tom made the first move, and gathering together four pieces of jade, the two strings of amber beads and from the centre counter several bits of carved ivory, pushed them toward Ling with the remark:

"How cheap will you sell all these together?"

Ling commenced to study the tags. Tom interrupted:

"Of course you guarantee everything to be genuine?"

Ling looked up: "All number one chou!"

"All right," said Tom. "Now make a good cheap price."

Ling turned over the tags. Then reached behind him for the square wooden frame with round counters on rows of wooden spindles and began clicking them up and down. Shortly he finished and, looking at Tom, said:

"Three hundred forty dollars, proper price."

Tom hesitated a moment, then: "Make it cheaper than that."

Ling said, with the old smile: "No can do. Three hundred forty dollars proper price." Nan smiled an approval toward Tom.

Tom was silent a moment and then said, deliberately: "I'll give you three hundred dollars for the lot."

Nan suppressed a gasp.

Ling replied gently: "No can do."

Tom was becoming impatient. He picked up the amber beads and putting

them down shoved them toward Ling, saying firmly: "I'll give you \$310 for everything. That's proper price."

Again from Ling: "No can do. Three hundred forty dollars proper price."

Tom countered once more: "Yes can do. It's all I'll give."

Ling, equally firm, yet with a touch of gentleness, repeated: "No can do."

"I'm sorry," said Tom, and then he played his last card. He took Nan's arm, saying boldly: "Come, my dear, as he won't sell at a reasonable figure we'll go to the other shop."

Nan appeared reluctant to leave, but a silent pressure from Tom's hand on her arm and she started with him toward the door. Tom called back to Ling: "Three hundred ten dollars, last chance."

There was no answer. Tom had opened the door and they were crossing the

threshold when from the shadows came softly to their ears two words:

"Can do."

Immediately they were back at the counter, Nan all smiles and Tom looking quite self-satisfied, while Ling, his beady eyes glistening, displayed the same bland smile. As the packages were handed over, Ling, still smiling, remarked: "Plenty cheap."

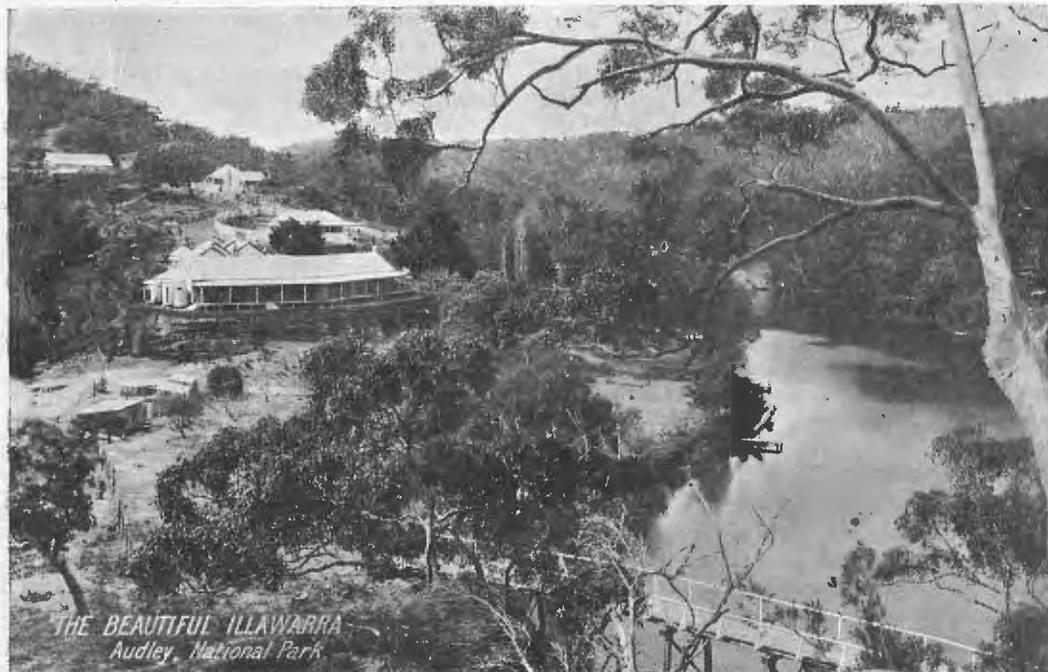
Outside Nan clutched Tom's arm and, looking into his face with an expression that belongs solely to happy brides, exclaimed:

"You wonderful dear!" Tom laughed.

Inside the shop there was another laugh up a Chinese sleeve at an easy profit made from a foreign devil. Incense would be burned at once to the good Joss.

Three months later in New York an expert declared that the articles would have been reasonable at more than twice the price.

ON THE SOUTH COAST, N.S.W.



The panoramic view from Bulli Pass and Sublime Point is regarded as one of the finest of its kind in the world. The Pass is exceptionally favoured in its grand scenery and wealth of vegetation.

SECRETS OF MARS

WHICH WILL BARE THEM—ROCKET, RADIO, OR CAMERA?

SCIENTISTS COMBINE TO SOLVE THE PROBLEM

ROCKET, radio or camera—which will be first to lay bare the secrets of Mars?

Of course, it isn't at all certain that any one of the three will prove a successful Sherlock Holmes of the skies, but scientists, lured on by an age-old curiosity concerning our neighbouring planet, are pressing along all three paths.

The latest development to set the scientific world again agog over the old question of whether there was life on Mars was the announcement from Paris of B. McAfee, American scientist, and Professor David Todd, American astronomer, that they purposed to snapshot the planet by using an abandoned mine shaft in Chile as the barrel for a telescope.

Only a short time before Signor Marconi, of wireless fame, had put a kick of interest in the most fantastic of scientific inquiries by suggesting that a radio signal of 150,000 metres which he had picked up might have come from some Martian armed with a mammoth sending set.

Daring Individuals Offer to Make Trip in Rocket.

But it was left to Professor Robert H. Goddard, of Clark College in Worcester, Mass., to suggest making an investigation of the moon by means of a multiple charge, high efficiency rocket, capable of carrying cameras of other recording apparatus needed to explore the unknown regions of the upper air. As the claim was made that a rocket could be constructed of unlimited cruising power, it has been suggested that it might be shot up to Mars instead of the moon, which many scientists affirm is uninhabited. One or two daring individuals even have volunteered to be shot up in place of a camera.

The possibility that some folk might be wandering up and down the valleys of Mars has excited the curiosity of astronomers and laymen throughout all the ages; for Mars is the nearest planet to the earth and the easiest to observe.

Imaginative writers took their readers on trips to the moon and laid the scenes of their stories in the surroundings of Mars, Saturn and other planets, but there was little scientific knowledge to furnish a basis for such fiction.

The perfecting of the high-powered telescope and the adaptation of photography to the uses of the astronomers quickened their interest in the possibility of life on another world. Mars, which was seen to have large areas of a bluish green and other areas of an ochre red, with patches of white at the poles, was believed by many astronomers to be capable of supporting life in some form.

Schiaparelli Observed Engineering Work on Mars.

Schiaparelli, an Italian astronomer, announced in 1871 that he had found the surface of the planet scarred by many lines, which were perfectly straight, and seemed to have some system, like vast engineering works. He called the lines canals, and said he believed they had been constructed, and were not simply cracks in the surface of the planet.

Professor Percival Lowell erected an observatory in Flagstaff, Ariz., many years ago, and commenced a systematic observation of Mars. More than ten years ago he startled the world by expressing his belief that Mars was inhabited by intelligent organisms living in a civilization much farther advanced than ours.

The canals, he said, were really big ditches bringing water from the poles to irrigate the rest of the planet. The ochre red areas on the surface of Mars, he asserted, were deserts or fallow fields which became bluish green as the water flowed along the canals in the seasons.

Later, he said that he had watched the bluish green area, denoting land springing to life with the coming of the water, spread down the northern hemispheres along the borders of the canals to beyond the equator of the planet, and then gradually turn reddish brown with the waning of the

season. The water, he claimed, was from ice melting on the polar caps of the planet.

Temperature of Mars Too Cold for Life, Assert Some.

Other scientists took the opposite point of view. Some said the canals were only cracks in the surface of the planet filled with sand, impregnated with salts of various kinds, which became dark or light to the observer according to its moisture content. The temperature on Mars, they said, was too cold to support life of any kind.

Lowell retorted that his observations showed that the average temperature was 48 degrees Fahrenheit. The irregularity of the canals; their even spacing, the accuracy with which they made a great circle, such as navigators employ on a curved surface thousands of miles in extent, the manner in which some of the canals were paralleled at certain points and the regularity of the spots at the intersections of canals all testified, he asserted, to the artificial nature of the canals and justified a belief that they were made by sentient organism of high intelligence.

More than five hundred canals and oases, as Lowell claimed the spots to be, have been mapped out, and their names are so well known that Harvard Observatory announced last April that snow had been observed falling at Isidis, in the district of Syrtis Major, Mars. It was held by some that the canals had been developed to signal the earth, which must appear to the Martians as of immense size, being nine times bigger than Mars.

Marconi Picks up Radio Signal Thought to be From Planet.

With the development of wireless telegraphy several attempts have been made to get into communication with Mars with high-powered apparatus. Signor Marconi gave encouragement to that field of research recently, when he announced that in the course of experimenting he had picked up a signal with a wave length of 150,000 metres, about six times as long as any commercial apparatus in use to-day. Marconi said the letter V had been repeated several times in international code. He suggested that possibly the inhabitants of Mars were trying to get into communication with the earth.

Two engineers of Omaha devoted two weeks recently to listening for signals from Mars. They kept their apparatus tuned

to catch such a message as Marconi described, but they heard nothing.

Controversy has run high over the bold proposal of Messrs. B. McAfee and Todd. A mine shaft in the Chilean Andes, which will point directly at Mars in 1924, will provide the barrel of their telescope, they announced, and a big pan of mercury revolving at high speed at the bottom will provide the mirror. The two Americans calculate that the surface of Mars will be magnified at least twenty-five million times, bringing it within a few miles of their cameras.

The mine shaft will be widened to fifty feet in diameter and sheathed. The pool of mercury at the bottom will be revolved at such high speed that it will assume a concave shape and become a mirror. The depth of the fortunately placed shaft is so great that there will be sufficient luminosity, the two scientists said, to enable them to take snapshots instead of time exposures. The Goddard proposal for aerial investigation also includes the use of cameras. To summarise his principle, the determining factor of the efficiency of a rocket is the velocity of the ejection of gases due to the explosion of propelling material. By increasing this velocity, through increasing the proportion of the propelling material to weight of projectile, and through a greatly improved nozzle-shaped passage for the escape of gases, Professor Goddard claims to have raised the efficiency of the rocket to nearly sixty-four per cent.

Many investigators are convinced that life exists on Mars and expect to prove it with the novel telescope. What they will find on their photographic plates is the object of speculation by scientific men the world over.

Lowell Says Surface of Mars is Level and Uninteresting.

Lowell has said that Mars is level and uninteresting, with no mountains and only a few dried-up beds of shallow seas to diversify its topography. More than one-half of it is desert land and the rest is only green when the canals are bringing water from the polar ice caps. Dust storms, which blot out hundreds of square miles of the planet's surface from the view of scientific observers, sweep over its equatorial section.

The physical conditions of Mars are entirely different from those we know on

earth. The force of gravity exerted by Mars is only three-eighths that of the earth, while the atmospheric pressure that is about fifteen pounds to the square inch at sea level on our world is less than four pounds on Mars, according to scientists. The air is very thin and no known animal could live on it. These conditions, however, make it possible for great weights to be lifted with little effort.

Lowell computed that the Martians could do seven times more work than human

beings could accomplish, with the same amount of effort. A human observer on Mars, he said, would be impressed by the slowness and flatness of his surroundings.

An elephant could leap like a gazelle in such an atmosphere, he said; water would flow like a hesitant lazy current and a stone thrown into the air would sink with graceful moderation to the ground. He made no attempt to describe how the Martians themselves might appear to worldlings, but he said they would not resemble human beings.

BREVITIES

BOOSTS FRENCH CARS, USES AMERICAN AUTO.

Paris does not know whether to laugh or be indignant over an incident connected with the opening of the automobile show in the French capital.

According to the despatch sent out by the Philadelphia Public Ledger news service, the show was formally opened by an address by M. Dior, Minister of Commerce. M. Dior, in a lengthy address, declared that the French manufacturers are the leaders in the automobile industry, declaring that the salon was a triumph for French industry, that French cars had been proven the best in the world, and that all must work to maintain the leadership over foreign products.

Much applause followed and all would have been well, but as the Paris papers noted next day, and as was stated in the Ledger despatch, the Minister then walked out of the salon and with great dignity entered his American-made Cadillac limousine and was driven away.

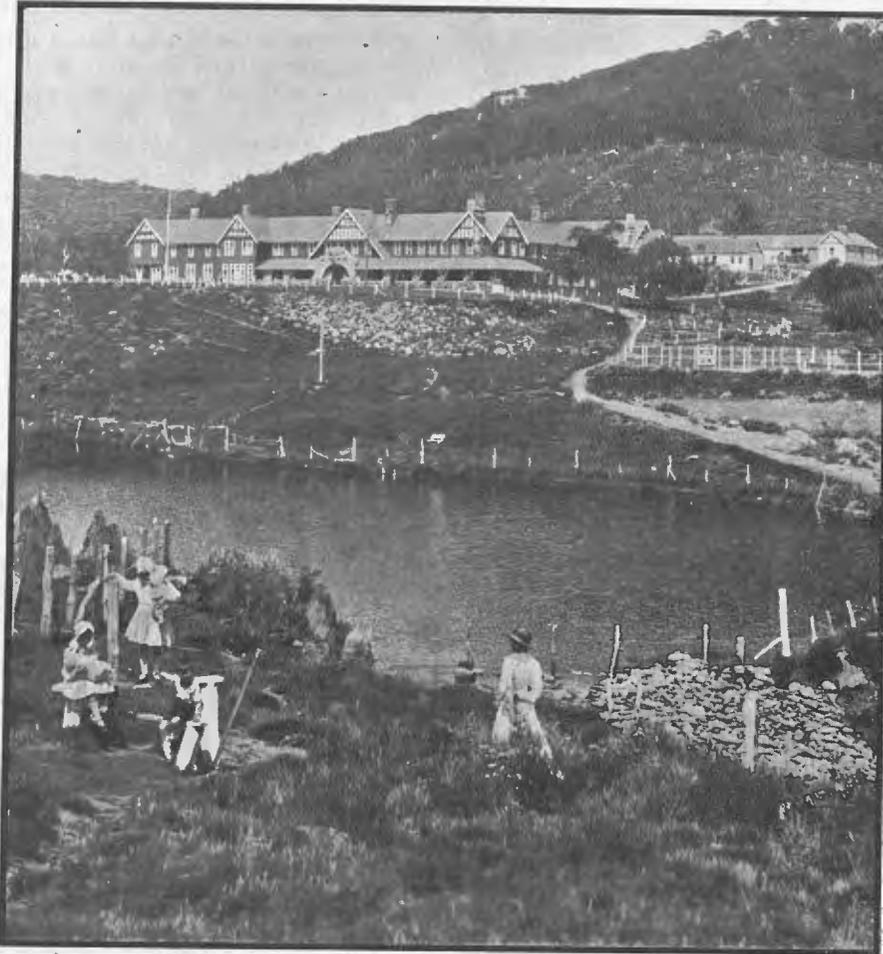
DRIVER-LESS CAR.

The first radio-controlled motor car has appeared in the streets of Dayton, Ohio, according to the *New York Herald*. No one was in the car—to all appearances a conventional one, eight feet long—yet it made its way through the main streets, obeying the traffic signals, taking the turns, and blowing its own horn at careless pedestrians. The car was driven by its inventor, Captain R. E. Vaughan, from another car following it at a distance of about seventeen yards.

WILLIS ISLAND.

The wireless message from Captain J. K. Davis, who is spending five months on the storm-warning station at Willis Island, indicates the value to the Commonwealth of that little outpost in the Pacific. Now that Queensland's cyclone season is approaching, it is satisfactory to learn that this "new atom of the Empire" is able to report the approach of South Pacific hurricanes twenty-four hours before they strike the Queensland coast. It was an intrepid task to establish the wireless station on the Willis Island, for that island is so small and so low that a big wave might break clean over it, with disastrous results. But when the project was first mooted by the Australian National Research Council, Captain Davis, who had gained world-wide fame as the commander of various Antarctic explorations, volunteered to carry out the whole job at his own risk. This offer was gladly accepted by the Federal Minister for Home and Territories, and about £4,000 was made available for the special apparatus in connection with it. In the past coastal shipping and agricultural interests have suffered severely from cyclones that have burst upon them without due warning, but now that the Willis Island station and other wireless sentinels are being established off Australia's eastern seaboard that menace should at least be speedily reduced. Besides watching out for the approach of storms, the party at Willis Island has its daily routine of meteorological observations, which are periodically wirelessly to Melbourne and Brisbane.

KOSCIUSKO, AUSTRALIA'S PLAYGROUND



Kosciusko is an all-year-round resort dear to the heart of every Australian. Summer is one long round of outdoor sport, whilst winter makes possible all the snow revelry hitherto associated only with Norway and the European Alps.

ROAD TO SUCCESS

Tact must be used; as a matter of fact, the fine art of getting in money is a vital part of salesmanship requiring much study, and no salesman can consider himself a complete success till he has mastered it.

* * *

The use of the word "tact" recalls a good story. A certain firm, when accounts became overdue, used a small sticker bearing the following: "Man is dust. Dust settles. Be a man."

If you have seriously made up your mind to make a success in life, there are many stiff fights before you; heavy drafts will be made on your faith and enthusiasm; you will have to scorn delights and live laborious days. But at the end of it all you will have more than has been earned in coin of the realm: you will have the joy and satisfaction of having done sound work, beneficial to yourself, your house and the community at large.

THE PSYCHOLOGY OF FLYING

WHY THE BEST AIRMEN ARE ARTISTS

By CLARENCE WINCHESTER, Author of "Complete Aeronautics"

PEOPLE who love the beauties of Nature and have artistic susceptibilities should never fly. If they must, they should fly only at the edge of the evening, and should glide into the blue magic of the dusk."

Thus an ex-Royal Air Force observer, who claims that the flattening of the earth kills its beauty, and that in the air one does not experience the joy of going round a corner or of climbing to the crest of a hill to find fresh visions and capture new scenes.

Yet, in spite of this claim, which partly corresponds with my own experience, I will come right to the point by stating that artists, and artists alone, are the people who stand any chance of excelling as air pilots. A revolutionary and somewhat bold statement this may be, but it is based on a very careful study of many pupils who have passed through my hands, pupils of all ages and nationalities.

The Sense of Touch.

A few days ago a Royal Air Force major happened to remark to me that he considered far too much attention is paid to physiology and far too little to psychology when it is a question of the admittance or exclusion of a candidate for flying. Here, for once, an officer confessed to a liking for the finer side of men as opposed to their capabilities in the realms of brute force. In short, he preferred the Carpentier type to the Beckett. This has an important bearing on the present argument.

It will be readily acknowledged that the main qualification for an air pilot is a highly developed "sense of touch," or, in other words, the ability to "feel" what he is doing in the air. This aspect brings me down to the question of art. I will admit that there is a dividing line between the poet, the painter, the musician, and the air pilot..

A Fleeting Song.

The first three are artists in two senses. They are constructive and expressive. The air pilot is merely expressive, his instrument of expression being an aeroplane. He does not necessarily construct his own instrument of expression. But the poet does; and the painter, and the musician. They construct sentences, arranged in approved form, or pictures, or notes of music on paper. Their work takes on a concrete form—and lives if it is sufficiently deserving. But the air pilot—his is more like the singer who expresses her soul in a fleeting song. Her notes are borne away and remain only in the memory—just as the artist-pilot's beautiful flying lingers in the memory of those who are attuned to it.

A strange theory this may sound, but close experience of pilots and piloting during the last ten years has taught me that it is a theory worthy of investigation. Few people have not seen a really masterly display of aeroplane piloting. Those who have could surely appreciate the graceful outlines described in the air by a master pilot who has a soul and a knowledge of symmetry. A man without a soul can never hope to fly, any more than he can hope to climb Parnassus and sport with Apollo.

To see more closely the air pilot's connection with art it is only necessary to cite one or two examples of outstanding "aerial individuality." That it is possible to express one's individuality in the air I will challenge anyone to deny. The late Gustave Hamel was, to my mind, the supreme aerial artist. His very walk revealed his sensitive temperament. I could always pick out Hamel in the air, even though I might not know in which particular machine he sat at the controls. His piloting was the astounding pre-war example of aerial artistry.

Case of Captain Ball.

Other examples have since arisen, chief among them being D'Annunzio and the late Captain Ball. Of the latter I once wrote: "The secret of his success was a nervous sensitiveness usually found in artists, musicians, and painters. To possess 'hands'—to feel part of an aeroplane that really has a temperament of its own—is very important so far as actual flying is concerned."

Of D'Annunzio's normal art we know. His aerial art is also outstanding, and I am told that as a pilot of the "decorative" variety he stands very high. To see D'Annunzio's personality revealed in his aerial antics must be a treat indeed, and one that would, as I have said, linger long in the memory.

The Ecstasy of the "Loop."

The heavy, sluggish, unimaginative type of man is never an artist in temperament. And he is never an accomplished air pilot. He could not feel, as I and many other pilots have felt, that wonderful moment of ecstasy that follows a perfect "loop" or other evolution. There is then a thrill of

having accomplished a perfect design. The wonderful feeling of having described a beautiful "loop" is indescribable. It may be a form of madness. If so, it is a very pleasant form, and all true artist-aviators know what it is.

The temperament of the poet and painter is essentially the same as that of the air pilot, each being highly sensitive to internal (or emotional) and external impressions. That is why many pilots belong to the "nervy" or hypersensitive school—which is a surprise sometimes to the uninitiated, who are apt to expect someone on the lines of a "superman with nerves of iron, a long aquiline nose, hawk-like eyes, and a firm chin," a type invented by the ever-ready newspaper reporter.

I would point out, finally, that my remarks apply mainly to pilots who are accustomed to fly small, sensitive machines that require very light handling. The larger and heavier aeroplanes, such as the Vickers-Vimy or the Handley-Page, are not those on which one would endeavour to express overmuch of one's individuality.

COMMERCIAL AVIATION

NEW ENGINEERING DEVICE

Successful completion of a new power unit for large airplanes, which assures non-stop flights from New York to Liverpool, or San Francisco to Hawaii, in twenty hours or less, at rates competing with first-class steamers, has been announced by the Gallaudet Aircraft Corporation, East Greenwich, R.I., where three four hundred horse-power *Liberty* engines, geared to one eighteen-foot propeller, were put through final tests.

The military importance of this development is declared to be of as great significance as the commercial, as an airplane of three or more units, representing a total of four thousand horse-power, will have a cruising range sufficient to command the ocean, carrying in its flight twelve tons of bombs or torpedoes.

The engineering development is declared by visiting scientists to be the most important step in aeronautics since the application of the improved internal combustion engine to flight. It is known as the "Gallaudet Multiple Drive," and consists

of the adaptation of the clutch, which made the automobile practicable, coupled with gears which enable the propeller and engines to operate at maximum efficiency.

The engines and giant propeller were mounted on a test stand twenty-five feet high and operation with one, two or three units was demonstrated. The propeller was turned at eight hundred revolutions per minute and the engines at one thousand and eight hundred, which has long been sought as one of the missing elements necessary to practical commercial flying. In the famous flight of the *N.C.4* across the Atlantic, which was the best performance hitherto made with *Liberties*, both engines and propellers were run at about one thousand and five hundred revolutions per minute, which meant a loss of speed and power. The nacelle housing the engines is so constructed that in flight it actually adds the equivalent two hundred horse-power to the one thousand twelve hundred naturally obtained.

WIRELESS AMATEURS AID FLOOD VICTIMS

PORTABLE STATION ERECTED AT SCENE BRINGS PROMPT AID TO CITIZENS OF HATCH, NEW MEXICO

By R. W. GODDARD

ABOUT six o'clock in the evening of August 17 a cloudburst broke over the mountains to the southwest of the Rincon Valley, in New Mexico. The next day rumours drifted down the valley that it had caused a destructive flood, washing away towns, farm houses, crops and stock. Immediate action was taken by the Las Cruces Chamber of Commerce. A meeting was called and a committee appointed to go up the valley and ascertain the extent of the damage and render any necessary aid. A large fund was raised on the spot to carry out this work.

The writer was appointed a member of the committee and proposed the utilisation of the portable wireless stations 5FY and 5FZ of the New Mexico College of Agriculture and Mechanic Arts in connection with his own station 5ZJ as a means of rapid communication between the flooded area and the Chamber headquarters at Las Cruces. The idea met with immediate favour. By rapid work with the local telephone, E. Kiernan, a student at the college and member of the college radio club, was reached, who agreed to assist in the work. In an hour and a half, the two stations were packed in a trailer and rolling behind the writer's "Henry Ford" toward the stricken area. Two hours later we arrived at Rincon, forty-one miles up the valley, on the edge of the flooded section.

The rest of the day was spent in going about observing the extent of the damage and determining the number and needs of the homeless people. The next morning one of the portable stations, 5FY, was set up at Rincon and all necessary information radioed to 5ZJ at Mesilla Park, and from there telephoned to Las Cruces. Acting on the advice given by radio, food, clothing, blankets, tents and cots were sent up by truck. The Salvation Army and the Red Cross of El Paso, Texas, also sent workers to the scene, all combining forces in a

general relief committee so that there would be no duplication of effort.

At times some difficulty was experienced at 5ZJ in receiving on account of static. Invariably this would become bad about noon and get worse until sundown, when it would remain about the same until after sunrise the next morning. It would then clear up and practically disappear. This trouble did not bother 5FY at all, the reason probably being the fact that the antenna at 5FY was much lower than that at 5ZJ (ninety-six-foot fan). In fact on the morning of the 20th, work was carried on while a thunderstorm raged about 5FY. Had this storm been at 5ZJ, work would have been impossible, as sparks two inches long can be drawn from the antenna under such conditions.

The following extracts from the *El Paso Morning Times* of August 19 gives a fairly accurate account of the flood:

Hatch, N.M., a town of five hundred residents, was wiped out by a flood, following a cloudburst yesterday, only three buildings surviving the rush of waters. Many of the residents had to flee in their night clothes. They escaped to the hills nearby without loss of life. All are homeless. Damage to buildings and crops in the vicinity of Hatch will reach a half million dollars, estimates last night indicated. The flood began soon after a cloudburst struck Santa Teresa, a village in the foothills two miles west of Hatch. Representatives of the western division of the American Red Cross and the Salvation Army arrived at Hatch from El Paso and other cities of the south-west last night with supplies, food and tents. The Las Cruces Chamber of Commerce sent a relief committee which at once took charge of caring for one hundred and fifty residents of the stricken town. Auto trucks from Las Cruces, El Paso and nearby towns are rushing provisions to the scene.

Dean Goddard, of the New Mexico College of Agriculture, and Mechanic Arts,

and Thomas Brownlee, installed a radio telegraph station and kept officers of the Las Cruces Chamber of Commerce advised of the situation.

The New Mexico College of Agriculture and Mechanic Art's portable radio stations 5FY and 5FZ are complete units designed by Dean Goddard, of the Engineering School, and built by members of the College Radio Club. Each consists of two boxes eight by ten by fourteen inches, containing the receiver and transmitter respectively, a larger box in which the antenna wires and ropes are packed when moving and which serves as a table in camp, a six-volt Edison storage battery and a forty-five-foot telescoping mast. This latter is often dispensed with, a tree, or telephone pole serving as a substitute.

The transmitter is of the damped wave type. The spark coil is a one-inch heavy duty wireless coil built by the Duck Company. The fixed gap is also of Duck manufacture. The condenser is a single section of the Murdock moulded type. The oscillation transformer is an edgewise wound Murdock with special hinged mountings. There are five turns in the closed circuit windings and eight and three-quarter turns in the secondary. The hot wire ammeter, a General Radio Company's 0-1 amp., is mounted on the panel with a heavy short circuiting plug switch beside it. The antenna switch is of the double-pole, double-throw baby knife type connecting the aerial to the transmitter or receiver and disconnecting the battery from the transmitter when in the receiving position. The key is mounted on the cover of the case which serves as a desk when open. All of the apparatus is mounted on the panel and is thus readily removed from the case for inspection or adjustment.

The receiver consists of a case exactly similar to that containing the transmitter, with the apparatus mounted upon a panel and the B battery in a compartment in the base. The tuner is a simple single circuit hook-up as shown in the wiring diagram, having a 0.0005 mfd. tuning condenser and interchangeable inductance coils of different sizes for different ranges of wave length. The grid condenser is a variable like the series condenser, a De Forest C.V 500. Remler filament rheostats are used for the detector and amplifier tubes. Hard tubes requiring no critical adjustments are used with success.

The antenna system is made up of four aerial and four counterpoise wires each eighty feet long, of No. 14 B. & S. stranded lamp cord. The aerial wires are equipped with harness snaps at one end which snap over a copper band around the mast insulator. The other ends have quarter-inch brass plugs which fit with a taper into an insulated terminal block secured to the mast just above the instruments. The centre of each wire has an Electrose four-inch insulator to which the guy rope is fastened by other harness snaps. These ropes are also eighty feet in length. Thus with the centres guyed out at right angles to each other, the aerial takes the shape of a cube standing on one corner, the wires forming the edges. The counterpoise wires are laid out on the ground under the aerial wires and extend outward the full length. They are connected to another insulated terminal block at the ends. The mast is in two sections, each twenty-four feet long and two and one-half inches square, held together much like an extension ladder. The aerial wires and guys support the top section while the top of the lower section is guyed out with four ropes similar to those used for the aerial.

In setting up the station the two mast sections are telescoped, all aerial wires and guys snapped in place, the stick raised and the lower section guys run out and fastened. The top section is then hoisted by a rope and pulley and the aerial guys run out and fastened. The counterpoise wires are then laid and plugged to their terminal block. The instruments are set up and tuned and the station is ready for operation. This has been accomplished by three men in less than twelve minutes after arriving on the selected site.

In operating little attempt is made to tune accurately the transmitter to any particular wave length. The closed circuit is adjusted to about one hundred and eighty metres, and the aerial circuit has to be adjusted for each set-up to deliver the maximum antenna current. This varies according to the surroundings of the aerial and the condition of the spark coil vibrator points. It usually runs about 0.6 to 0.8 amps. The maximum daylight range is unknown. A distance of thirty-eight miles has been easily covered through heavy summer static. Our main trouble with the sets is in keeping the vibrator points in

good condition. They pit and burn quite badly after five to ten hours of continual use. In adjusting them we find we get better results if they are given a fairly stiff tension and made to vibrate so as to give about a two hundred and fifty spark note. The receivers work with great precision and reliability. Their simplicity and ease of adjustment make them ideal for this class of service. Different sized coils give a wave length range from one hundred and fifty to twenty thousand metres.

While the sets were designed and built,

concludes the writer in *The Wireless Age*, for maintaining communication between the several units and the College of our Reserve Officers Training Corps while on its annual military encampment trips to the mountains, other uses are continually appearing. Demonstrations at county fairs, conventions and other meetings, testing and experimental work, picnics and camping trips, Boy Scout outings and last, but not least, during the recent flood, represent a few uses that have proved their worth and practicability.

HERE AND THERE

FRENCH AIRMAN CLIMBS 34,768 FEET.

The airplane height record made at Dayton, Ohio, on February 27, 1920, by Major Schroeder, was beaten in France recently by a French airman, Lieutenant Georges Kirsch. Unfortunately, however, the Frenchman's record cannot be accepted officially, as he was forced to make a landing at another point than the one from which he started. His barometric register, when he landed showed that he had risen to a height of 10,600 metres (about 34,768 feet), which is 500 metres above Major Schroeder's record, which still stands as official.

The attempt was the ninth which Lieutenant Kirsch has made, but on former occasions he had never been able to get much beyond 9,000 metres. To-day he profited by previous lessons, and when he reached the 7,000 metre mark he took the climb more slowly than in earlier flights, and got safely through the change of temperature zone into rarefied air without mishap.

When he decided to descend, his 300 horse-power motor was still working well, but on the descent a stoppage in his carburettor occurred which compelled him to volplane to the nearest airdrome instead of landing, as required by the rules, at the airdrome from which he started.

The initial calculation of the height attained by Major Schroeder in his flight at McCook Field on February 27, 1920, was 36,020 feet; but after a careful homologation of his records the Bureau of Standards reduced this to 33,000 feet.

RADIUM.

Radium is, almost beyond comparison, the most valuable element in the world, says the *Compressed Air Magazine*. One gramme of radium, which is about a thimbleful, costs 120,000 dollars, as opposed to 150 dollars for an ounce of platinum. So powerful is it when mixed with other materials that even a minute particle is effective in making surfaces self-luminous for years. It is this quality which makes radium-luminous material commercially possible. The great value of radium is due to its scarcity, and to the great difficulty in isolating it after it has been found. Much of the radium of the world now comes from the carnotite ores of the United States. A great portion of this comes from the Undark radium mines in the Parado Valley of Colorado. The ore is found in narrow seams. It is transported sixty miles on the backs of burros and mules and then by rail to Orange, N.J. One gramme of radium is derived from 250 tons of ore.

HAWKER'S FIRST FLIGHT.

It is perhaps not generally known that in Australia, before taking up aviation in this country, Hawker had done a considerable amount of motor cycle racing, says *Motor Cycling*. His first flight in an aeroplane was at Brooklands, in 1912, when, a few mornings after his arrival, he turned up before anyone else was about, and pushed one of the biplanes out of the shed. Hawker straightway took the machine into the air, confident that the matter was not difficult, provided one had a complete grasp of the theory and principles of artificial flight. Soon the machine was a mere dot in the sky, and in due course the biplane made a perfect landing.

Aviation Australia

Financial Help for Parer.

LEUTENANT PARER, who is engaged on a flight around Australia, has been advised that the sum of £12,000 is available in England to purchase a machine to enable him to compete in the international air race across the Pacific. It has been arranged that a member of Lieutenant Parer's party will proceed to England in the near future to complete the financial arrangements. In the meantime the aviator hopes to raise additional funds as a result of engaging in passenger flights on his tour round the continent.

Mail Service Contracts.

The Civil Aviation Branch of the Defence Department has announced that the tenders of the Larkin-Sopwith Supply Company, of Melbourne, and Mr. F. L. Roberts, of Brisbane, have been accepted for the Sydney-Adelaide and Sydney-Brisbane air mail services respectively. The subsidy for the former service is £17,500 for one year, the distance being seven hundred and fifty miles; and for the latter £11,500 for the same period, the distance being only five hundred and fifty miles. The Larkin-Sopwith Company will use *Handasyde* monoplanes of six-passenger capacity, fitted with Rolls-Royce *Eagle VIII* engines of three hundred horsepower. These machines are practically identical with those built to the order of the British Air Ministry for the London-Paris service, and embody the latest improvements in design and comfort. A number of auxiliary planes of the *De Havilland-4* and *Sopwith-Wallaby* types will also be provided. Similar machines will be used on the Sydney-Brisbane route. The service on each line will be once a week each way.

Central Queensland Service.

In this issue tenders are invited for the establishment and maintenance of a subsi-

dised aeroplane service between Charleville and Cloncurry, Central Queensland. The term is for one year from May 30, 1922, and tenders close on January 31. It is anticipated that several firms will compete for the service.

Aerial Medical Service.

Some interesting details of the pioneering work which has been carried out in connection with aerial mails and services generally, was furnished in the report of the Queensland Section of the Australian Aero Club at the annual meeting held recently. The need for an aeroplane service to convey medical aid to people in isolated localities was referred to by the Hon. Secretary of the Club, Mr. H. B. Davis, in responding to the toast of his health.

"What was most needed in Queensland at present," he said, "was an aerial medical service in the west. Every day, and especially since the report of the Commission on the north-south railway, one heard of the absolute martyrdom suffered by our finest countrymen—the people of the far west—in the event of accident or sickness. What was required was well-equipped machines at, say, Cunnamulla, Longreach, and Winton, and telephonic or wireless telephonic communication with the neighbouring stations."

The Secretary also dealt with the matter of landing grounds, and stated that in the New Year it was the Club's intention to start an intensive campaign of mapping out grounds throughout Queensland—a work in which he invited the co-operation of all members.

That the service suggested by Mr. Davis is practical, has been proved by the Queensland and Northern Territory Aerial Services Limited. Not long ago the infant daughter of the manager of a sheep station, thirty-two miles from Longreach, became seriously ill. Owing to the heavy rain, it was impossible to send medicine or bring the child

AUSTRALIA'S FIRST AERIAL MAIL



On Sunday, December 4, 1921, Australia's first aerial mail service, between Geraldton and Derby, Western Australia, was inaugurated. The above photographs, taken just prior to departure from Perth (W.A.) for Geraldton, show: (1) The aerial mail bags being checked at the aerodrome; (2) Major Norman Brearley signing for the mails; (3) one of the machines about to start; (4) a close-up of the ill-fated "G-AUDI" that subsequently met with disaster, Lieutenant Fawcett, who was killed, is seen in the machine; (5) Major Brearley saying "cheerio" just before taking-off; (6) another of the three machines getting under way.

into the town. Communication was established with the aerial company, and Lieutenant P. J. McGinness left at once by aeroplane for the station. Within an hour the child and her mother were safely landed at Longreach.

Grafton Interested.

The announcement that Grafton is to be one of the three North Coast landing stations on the Sydney-Brisbane mail and passenger service has created considerable local interest. The service is expected to be in operation in April next, and a movement is on foot to afford the authorities every assistance in establishing an aerodrome and proper landing facilities. It is to be hoped this good intention will be carried into practical effect, for it is only by the most cordial co-operation between the authorities and the public that a full measure of success can be achieved. It cannot be too strongly emphasised that it is the duty of every citizen to assist the Government in a matter of this kind. The taxpayers have to find the money to finance such undertakings, and the greater the success the lighter the burden will be.

Scaring the Natives.

On the occasion of the recent visit of Messrs. Briggs and Birtles to Central Australia the natives were at first greatly alarmed at the appearance of the plane. An amusing story is told of the behaviour of a black gin who was tending the goats that provide the homestead with milk. She crawled and hid in the saltbush, and the milk-supply scattered in all directions. Frightened out of her wits, Mary left her nannies in the scrub and ran the whole three miles back to the homestead. "No milk to-morrer, boss," she panted. "Big feller eaglehawk come down from sky, pick up one-feller goat, pick up two-feller goat, pick up lot-feller goat. All gone finish. No milk to-morrer."

Licenses for Aviators.

A statement prepared by the Controller of Civil Aviation (Lieutenant-Colonel Brinsmead) shows that to the end of October, 1921, three private and fifty-seven commercial licenses have been issued as follows: Ground engineers, ninety-seven;

aircraft registration certificates, fifty; aircraft air-worthiness certificates, thirty-eight; aerodrome licenses, eight. Four applications for commercial pilots' licenses were rejected on the ground of medical unfitness. Only one applicant for a ground engineer's license failed to pass the test. Aircraft registration certificates were refused in seven cases, and air-worthiness certificates in five. The figures indicate a steady increase in the number of persons seeking to adopt aviation as an occupation. When the various subsidised services are in operation it is anticipated that a considerable stimulus will be effected. Like most other undertakings aviation has had rather a difficult period to survive in its early days, but there is every reason to believe that it is now fairly upon its feet, and big things may be looked for in the future.

By Air to Australia.

Mr. G. Holt Thomas, the well-known authority on aviation, contends that at a certain altitude the air throughout the world shows a great similarity, and although the ground conditions may vary, the London-Paris trip may be taken as a fair average standard. The expense of an hour's delay on a short trip is considerable, Mr. Holt Thomas points out, but a delay of even a day on the run to Australia would be immaterial. A breakdown would always bring a fresh machine and pilot within two and a half hours. The result would be that the time of arrival in Sydney would be merely delayed a couple of hours. That the precision of the German air raids and British retaliations without the assistance of lighting proved that night flying is practical, is the considered opinion of Mr. Holt Thomas.

Where Aerial Communication is Needed.

A few months back an interesting trip was carried out by a pilot of the Queensland & Northern Territory Aerial Services Limited, in a *B.E.2E* machine.

Mr. Murray, manager of Brighton Downs, had been held up in Winton for fourteen days after the heavy rains which had fallen in the district. The roads were impassable for any kind of wheel traffic. One can imagine the position after eight inches of rain in a country with no made roads, and no bridges over the rivers.

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Leaving Winton in the early morning, Brighton Downs, one hundred and forty miles down the Diamantina was reached before breakfast. During the day Mr. Murray attended to correspondence and general station business, and then flew back to Winton again in the evening.

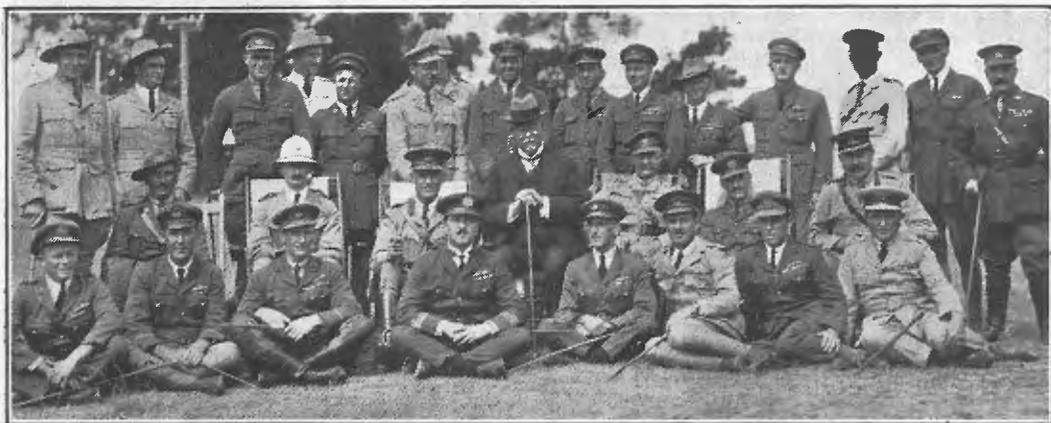
Needless to say, Mr. Murray was very pleased with his trip. During the run along the river he had an excellent view of the country covering many hundreds of square miles, and also of the Diamantina flood waters. But the main advantage was that he was able to visit his station by air, whereas it would have cost him another week's wait in order to get down by car.

Adelaide, Mildura, Hay, Narrandera, Cootamundra, Sydney, Newcastle, Kempsey, Ballina, Grafton and Brisbane.

In addition to mails, provision is being made for the carriage of passengers and freight in machines of the most up-to-date and most modern design. These machines are *Handasyde* monoplanes fitted with 360 h.p. *Rolls-Royce* engines, and have recently been designed for the London-Paris service.

The saloon is arranged to seat six passengers in comfortable upholstered chairs. Being completely enclosed, passengers are not subject to any slipstream, noise or cold, and are able to converse in comfort. Access to the saloon is by means of two doors,

FAREWELL TO FIRST AIR FORCE, LIVERPOOL, N.S.W.



His Excellency the State Governor of New South Wales, Sir Walter Davidson, paid a visit of inspection to Liverpool Camp on December 12 last, on the occasion of the parade and sports meeting, to bid farewell to the members of the First Air Force, who completed their course of military training on December 15. In the above photograph His Excellency is seen sitting in the middle of a group of flying officers.

Brighton Downs is only one instance in thousands where aerial communication is wanted. There is no telephonic communication; the nearest doctor is one hundred and fifty miles away; roads and rivers are impassable after rains; while on the station there are two women and a staff of about ten men. Are not these men and women who go out into such lonely back places entitled to some assistance, or is it still to be "all for the city"?

AIR MAIL SERVICES.

Adelaide-Hay-Sydney-Brisbane.

About the end of April, 1922, an air mail service will be established along the following route:

one on either side near the forward end, and as the machines are monoplanes, passengers step in and out in the same way as they would a taxi-cab. The cabin is nearly six feet high, and unbreakable windows are fitted to enable passengers to enjoy the exceptionally fine views obtained when travelling by air.

Immediately at the rear end of the saloon is a lavatory with communication by means of a sliding door. Ventilation shafts provided with shutters permit the air in the saloon to be changed sixty times per hour.

A fireproof bulkhead divides the engine compartment from the saloon.

There is no fabric on the vital parts of the machine, and in this respect they differ

from any type of machine yet imported into Australia. The wings, which are nine feet above ground level, are covered with two-ply. This reduces considerably the cost of upkeep and the depreciation due to weather.

The under-carriage—a most important feature—is constructed on entirely new lines. Exceptionally large wheels with a track of ten feet and a shock absorbing arrangement, allowing eighteen inches travel, take up landing shocks.

These main wheels are fitted with brake drums similar to those fitted to a motor car, and in the event of a forced landing, where it is not possible for want of space to land with a low flying speed, the machines can be landed actually "tail high," and by applying the brakes, a pair of smaller wheels suspended from the engine bearers, are brought into contact with the ground, thus preventing the machine damaging its propeller or turning on its nose through being pulled up quickly.

As ninety per cent of aeroplane accidents are due to the lack of control after the aeroplane touches the ground, there is no doubt that this improvement will be of great value.

The whole of the machine being well sprung, no jar or shock should be experienced by passengers, even with the roughest of landings.

The maximum speed of these machines is one hundred and fifteen miles per hour, and an average speed of ninety miles per hour will be maintained on the service. This allows a sufficient margin to overcome any average wind which may be experienced.

One hundred gallons of petrol are stored in two tanks contained inside the wings of the machine, thereby occupying no valuable space in the main body.

A large compartment is provided for the carriage of mails, freight and luggage, etc.

Under present arrangements machines will leave Brisbane on Fridays, arriving at Sydney about eight hours later on the same day. The journey will be continued from Sydney to Hay on Saturdays at noon, and from Hay to Adelaide on Sundays, arriving at the latter city about midday. The return journey from Adelaide will be started at 12.30 p.m. on Sundays, staying over-night at Hay and reaching Sydney at noon on Mondays. The following day the flight from Sydney to Brisbane will be

completed. In this way, passengers can make fast trips between Sydney and Adelaide over week-ends when the usual express train service is not maintained.

When the organisation is completed and the service is running smoothly it is possible that the flight from Adelaide to Sydney will be completed in one day. This will make it possible for travellers to breakfast in Adelaide to-day and have afternoon tea in Brisbane to-morrow.

The fares will be £21 single from Sydney to Adelaide and £15 from Sydney to Brisbane.

The service will be run under the style of "Air Mail Service, Limited," under the management of the Larkin Aircraft Supply Company Limited, and the directors will include Messrs. H. B. Howard-Smith, L. M. Macpherson, and H. J. Larkin.

Manufacture of Standard "Avros" for the Defence Department.

Squadron Leaders McBain and Marsden recently paid a visit to the Australian Aircraft & Engineering Company's aeroplane factory at Mascot, New South Wales, with the object of inspecting the progress of construction of the six machines which are being built in Sydney for training purposes in connection with the newly formed Royal Australian Air Force.

Squadron Leader McBain, Director of Equipment, also a member of the Air Board, expressed himself extremely satisfied with the progress that the Company had made in the production of the first batch of machines.

A difficulty that the Company has experienced from the outset has been the question of getting hold of adequate supplies of timbers, which have to be specially selected and well seasoned. This is only a temporary difficulty, however, as the Company has made arrangements with the suppliers in the various districts from which the timber is drawn to have the wood specially selected and put aside for future requirements.

It is a satisfactory state of affairs to know that there is an unlimited quantity of this valuable timber available in New South Wales and under the re-afforestation scheme adequate provision is being made for the future.

The Company anticipates having its first Australian-made standard *Avro* produced

some time in February. The public will be invited to the aerodrome on the occasion of its first flight, so that people may have an opportunity to see exactly what the A.A. & E. Co. is doing in Australia in reference to aircraft manufacture.

The Company's engineer, Mr. H. E. Broadsmith, has completed the designs of a large passenger-carrying machine which the Company is producing for the prospective requirements of the Queensland & Northern Territory Aerial Services Ltd. This machine, essentially a commercial type, particularly economical and efficient, should be finished by the end of January or early in February, and it is expected that she will give very efficient results on her test flights.

* * *

Story of Parer-McIntosh Flight.

The story of the Parer-McIntosh flight across the world is out at last in book form, and is most interesting and thrilling, although it is told in an absolutely unaffected and simple way by the pilot, Ray-

mond Parer, A.F.C. It is a good thing that the record has not been lost to the world, for the flight will surely be ranked as one of the big things in Australian history, and especially in regard to the development of aerial travel and Australian aviation, when passing time has given the right perspective. At present we are too near the achievement to realise its real greatness. The book is called "Flight and Adventures of Parer and McIntosh," but something more sensational and arresting would have been justified, such as "Across the World on the Wing," "The Great Aerial Adventure," or "The Flying Tramp," as the letter from the Governor of New South Wales—which appears as preface—suggests. He says: "Lieutenant Parer publishes 'Flight and Adventures.' I have not yet seen the book, but I doubt if he will picture the astounding temerity of it. Not in my lifetime has there been so careless an adventure; you would have to go back to Elizabethan days to match its daring."



DEPARTMENT OF DEFENCE.

Aeroplane Service Between Charleville and Cloncurry, Queensland.

Tenders will be received by the Secretary, Department of Defence, at Melbourne, until 12 noon on Tuesday, 31st January, 1922, for the establishment and maintenance of an Aeroplane Service in safe and suitable aeroplanes between CHARLEVILLE and CLONCURRY, Queensland, for the term of one (1) year, from 30th May, 1922, or from some such subsequent date as the Minister for Defence may approve, which date should not be later than five (5) months from 1st February, 1922.

Full particulars may be obtained from the Commonwealth Gazette, copies of which are available at all Post Offices.

GRANVILLE RYRIE,
Acting Minister of State for Defence.

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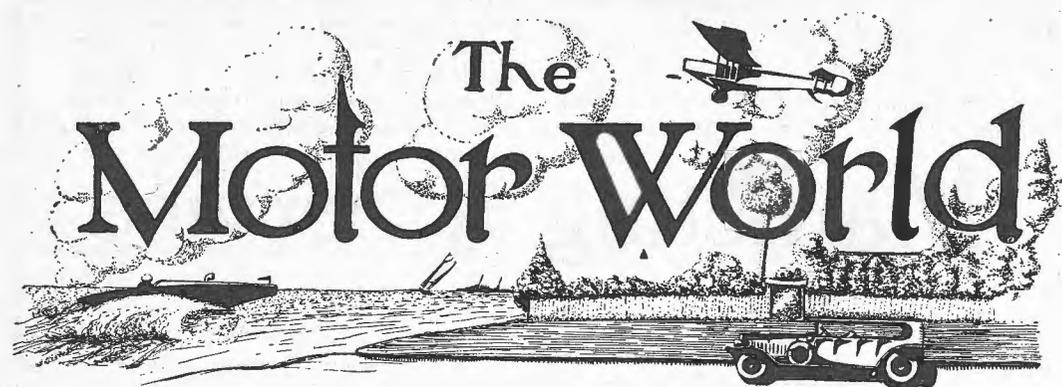
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By "SPARKING PLUG"

Dazzle Lights.

WHILST an agitation is on foot by some motorists in England to encourage car drivers at night to switch lights off when approaching other cars, Mr. Boyd Edkins, who is the New South Wales distributor for several gilt-edged lines of agencies, including the *Vauxhall, Humber, Renault, Mercer* and *Oldsmobile*. "Four," thinks the practice is a pernicious one started in all good faith by some courteous driver who wished to study the safety of others.

"To me, added Mr. Edkins, "it seems that those who followed the practice have never thought out the problem. Many have been brought up to consider it the correct thing; more have been coerced into it by the certainty of abuse if they refrained—which is another case of the rowdy minority frightening the majority into the adoption of the habit.

"The necessity for switching off is quite illogical. Carry the thing to its logical conclusion, and it will be found that when traffic is doubled or quadrupled, it will be impossible to keep headlights on at all and then how will drivers fare?

"When drivers switch off it may be alright for one, but not for the one who has not observed pedestrians, vehicles or obstacles ahead of him, in which case his action in switching off virtually amounts to suicide or murder.

"It would be more practicable and sensible to keep lights on and, as an act of ordinary caution, slow down when passing; for the sudden change from light to darkness makes observation very difficult and necessitates slowing down in any case.

"There is no such thing as a glaring headlight unless one chooses to make it so. The simple rule recommended to all drivers is to prevent the beam of the approaching light from striking the pupil of the eye. If drivers keep their eyes either straight ahead, or to the left of the road—peeping at the light from the corner of their eye so to speak—no headlight however glaring would worry any driver.

"The one thing to remember is to educate oneself to keep to the left both as regards the direction of the car and the line of vision. I have practised this rule for some considerable time with great success, and can honestly recommend its adoption.

"Before the Traffic Department instituted its regulation providing that the main beam should not exceed three feet six inches from the ground at seventy-five feet from the car everyone drove about with one hundred candle-power lamps. It was practicable to approach other cars then without accident—why not now? Yet thoughtless people make night driving irksome by yelling at others to switch off simply because they have done so.

"Glasses have been invented for anti-glare purposes, but they are dangerous in the hands of some drivers, for all such glasses destroy the distance view, even if they do give a fine spread in front of the car—where it is not required. The driver travelling twenty to twenty-five miles per hour requires his main light at least fifty yards ahead, and the faster he is travelling the further ahead he needs to see."

In concluding, Mr. Edkins suggested as a likely remedy that a patch four inches square should be painted on the wind-screen. If the driver protects himself be-

hind the blue square when a car is approaching with strong headlights he overcomes the glare trouble and is enabled to see well ahead.

As in England no doubt there is scope for considerable difference of opinion on the question. Perhaps some of our readers would like to express their views?

The Other Side.

Strangely enough this week's English mail contains a request in a contemporary journal that car drivers be requested to dim their lights when approaching other vehicles.

In advocating that an appeal be made to car drivers, the writer quotes the usual

within seven feet six inches of the centre line of the beam. Side illumination was much damped down, for fifteen feet from the centre line of the beam the effective illumination was but fifty-six feet. At eye level no dazzling effect from the lamp was experienced nearer than eighty-two and a half feet from the source of light, which must be considered satisfactory.

The second device consisted of a lamp with a parabolic reflector with the bulb placed centrally at the back. The front of the bulb was covered with a patch presenting a silvered surface towards the light and a black surface towards the front glass of the lamp. In this model the front glass



The new 13.9 "Renault." Boyd Edkins Limited, agents.

reasons, backed up by an account of a mishap which he met with, through, he contends, the failure of a fellow motorist to dim lights when approaching his car.

had saw-toothed indentations on its inner side and was plain on the outside.

Australia's Bad Roads.

Despite the eternal demand for up-to-date national roadways for commercial, strategic, and other purposes, the Government seems to have placed the Good Roads slogan in pickle for an indefinite period just as previous Governments had jettisoned the requests of past generations for the notorious North Shore Bridge.

Possibly all blame does not entirely rest with the present Ministry, as it certainly showed signs of earnestness when endeavouring to raise a £2,000,000 loan for good roads purposes.

The question of good roads should be regarded by the Government in much the

Tests to Solve Problem.

Official certificates have been published concerning R.A.C. tests of two Salsbury Anti-Dazzle head lights. In the first model the device is mounted in a lamp with a lens mirror behind the electric bulb as the principal reflector, and with a small lens mirror in front of the bulb that throws the light back to the principal reflector. The upper part of the front glass of the lamp has saw-tooth indentations facing outward. With a 44.8 candle-power bulb at 12.6 volts pressure the effective forward illumination was two hundred and thirty-four feet

same light as the construction of new railways, for the ambition in each case is identical, with the exception that the latter encourages communication and transportation from point to point without the cost of permanent ways and other expenditure associated with the construction of railway lines.

The vexed question of unifying the railway gauges of Australia and the enormous sum it is estimated the work will cost, should be silent sentinels constantly urging the Governments of the various States to encourage motor traffic in suitable districts. Just as settlers in the past followed the railways into the wilds of the Never-Never, so will motor vehicles quickly follow the trail of good roadways wherever constructed.

In Queensland the Premier (Mr. Theodore) is favourably disposed to the idea of "opening" new country districts in this manner, and he has been assured that a fleet of motor cars and lorries will hasten to prove the wisdom of his action.

A resident of Central Queensland, whose means of locomotion are confined to a motor cycle, has put his finger on the exact spot in a breezy and concise statement dealing with bad roads. It applies with equal force to all States of the Commonwealth, and no doubt will strike many responsive chords in the hearts of those who have been there before.

He says:

"Take the 'awful roads' complaint. Australia is the most thinly populated country of any size on the globe. Moreover, it is the 'newest' country from the point of view of civilization. Any sane being never expects to find in the newer countries roads similar to the European highways, which date from the Roman times in many cases, and beyond that period perhaps. We must accept comparatively poor roads as part of the programme till the population becomes large enough to provide the necessary revenue for road-building. The man who buys a motor cycle in this country should know that he is in for a rough time, more or less, according to locality.

"Australia has approximately the same area as the United States of America. In a land of such considerable size, all kinds of country are met with. Here, in Central Queensland, most of the hinterland is open black soil downs; it is similar to the Canadian prairie in some ways, and the

South African veldt in others; but the 'black soil' is, I think, unique. The 'roads' are like Topsy—they just grow. In the first place, a waggon meanders out to some newly opened up cattle or sheep station, and its tracks are followed by other traffic till the tussocky grass is worn down. One can trace it for miles ahead like a long dark ribbon. Where the traffic is light the grass between the wheel tracks is never worn down, so that you have twin tracks running parallel, and each one about a foot wide. We have months and months without rain sometimes, and these tracks beat down firm and smooth; it takes practice to enable the motor cyclist to keep the narrow track, but once the knack is mastered it is possible to ride for hundreds of miles through the pure, dry air and across glorious country as fast as the old jigger can clip along.

"But, if a storm cloud shows on the horizon, it is just as well to give the engine still more juice. Once rain falls in this country it is the end. Twenty points or more usually means leaving a motor cycle, though a car, with its wide mudguard clearance, can battle along up to a certain point. The black soil 'picks up,' and goes on doing so till the mud jams between the tyre and mudguards, and both wheels lock tight. In a frantic effort to keep going the rider gouges this stuff out with a stick or screwdriver, but another fifty yards pulls him up again.

"Sometimes, while the ground is still wet after rain, cattle will wander along the road for miles. In drying it sets hard, and every hoof track is as clearly defined as in a plaster of Paris cast, and it will remain so till the next rain. Under such circumstances, we lay our motor bicycles up here and use horses till conditions are more suitable. Why make a martyr of oneself in these matters? The motor cycle in the outback has a definite place in the scheme of things; but to ask it to do work that could be done more easily and efficiently on horse back, or in a light buggy, is only going to retard its popularity."

Where To Go To-morrow.

A good one-day tour, despite the fact that the roads are bad in the vicinity of Liverpool, is that from Sydney through Bankstown (twelve miles), Liverpool (twenty), Cross Roads Hotel (twenty-three and a half), keeping straight on (the road

RENAULT RELIABILITY

The outstanding feature of the 1,000 miles R.A.C.V. Trial was the marvellous performance of the

13.9 h.p. RENAULT

Right through the 1,000 miles the car was never touched by a spanner. Its staunchness and dependability were recognised and appreciated by all.

Study These Results:—

Class A.: RENAULT, FIRST.

PETROL CONSUMPTION: 32½ M.P.G.

OIL and WATER, ¾ gal. oil for whole journey.

2 gals. water were added for whole journey.

RELIABILITY, RENAULT—FIFTH, with 777 points out of a possible 800—and 18 of the last points were deducted only owing to a miscalculation in time of arrival on first day. Actually only 5 points were lost on account of Reliability.

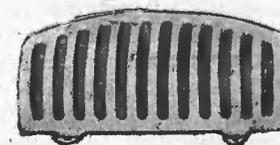
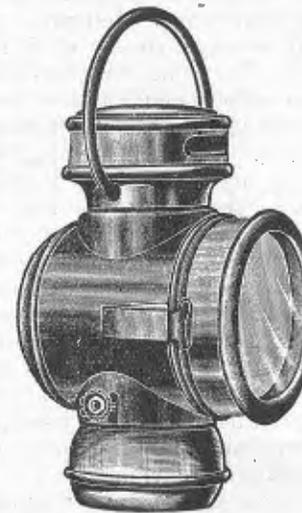
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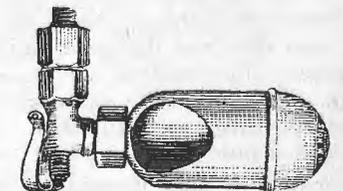
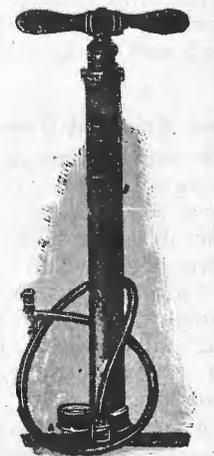
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to the right *via* Campbelltown Road takes the tourist to Camden) to Campbelltown (thirty-three). Turn left at the end of the town for Appin (forty-three), a pretty run over good roads. If, after leaving Appin, the tourist desires to visit Cataract Dam, steer to the left at the second turn (the first goes to Bulli direct, and keep straight on for Cataract Dam (forty-eight), five miles from Appin. The dam is worth seeing. Returning from the dam, take the road to the right after a mile, following it for a couple of miles to the Bulli Pass road, where the turn to the right should be taken. Another five miles, and the tourist crosses the Loddon River bridge, and another half-mile and the Bulli Pass hoves in sight. A magnificent view of the South Coast is had from the Look-out, turning to the right and down the pass to Bulli (sixty-two).

On the return trip, keep straight on after leaving Bulli, through Clifton (sixty-nine), Stanwell Park (seventy-two) to the top of Bald Hill, a stiff climb, from the summit of which another magnificent view of the coast-line may be had. Keep straight on, passing the turn-off to Helensburgh and turning right just under a mile beyond. After turning right, the route is through Waterfall (eighty-one), Heathcote, Sutherland (ninety), Tom Ugly's (ninety-four) to Sydney, total distance one hundred and seven miles.

Two Hundred Owners of One Motor Car.

From the community kitchen, community playground and community market, we have come to the community motor car. The Japanese were the first to see the advantages which such a plan may have for groups of people who are financially unable to own even a low-priced motor car, and who have, however, the same need for motor transportation that the wealthy man has.

A company was organised recently in Japan, with a capital of one hundred and fifty thousand dollars, for the purpose of selling automobiles. Each car will be sold to two hundred different individuals, who become shareholders, so to speak, in the car. Each of these shareholders pays ten dollars (£3), in return for which he receives a one year's interest in the car.

A definite time is assigned to each shareholder, during which the car is his per-

sonal property and can be used as he sees fit. For example, a man will be notified that his time will be, say, every other Monday from eleven o'clock to three o'clock. This plan is carried out with all of the two hundred stockholders, and each one gets his share of rides during the year. The plan nets the company two thousand dollars for each car sold.

For this enterprise, fifty-five used *Oakland* touring cars were purchased in Seattle, Washington, U.S.A. They were thoroughly overhauled, repaired and equipped with new tyres, and in some cases fitted with special bodies.

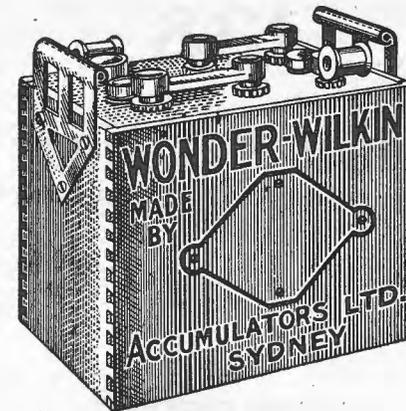
This novel undertaking marks a new departure in motor car selling. It may be assumed that the two hundred persons who pay ten dollars for their part ownership in an *Oakland* were totally unable to buy a car, and in this way they are able to enjoy, although for a limited time, the pleasures of motoring. Further, it seems likely that a good many prospective car owners will be found among them later on.

Motor Truck Transport.

No better illustration of the commercial value of motor transport could be afforded than the performance of the truck which recently completed the one thousand three hundred miles run from Melbourne to Brisbane at an average speed of fifteen miles per hour. The run was really in the nature of an experiment, and as such the truck had to take the roads as it found them, which is another way of saying that it had to travel over highways that in parts would have tested the stability of even a "tank." That it came through with flying colours is not only a tribute to the vehicle and those in charge, but a tremendous advertisement for the future of motor transport in Australia. Old prejudices die hard, and even in an age of progress like the present it is frequently necessary to draw attention to the value and possibilities of a new proposition by performing a feat of outstanding importance.

In a country like Australia an adequate transportation service can only be secured by the fullest possible development of the various forms of sea, land and air carriage which the ingenuity of man has devised. No one form of transport need be a rival of the other; rather must it be an adjunct.

As yet our railways fall far short of what the country requires, and when it is



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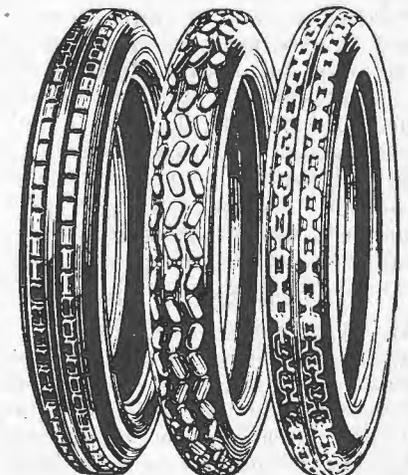
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remembered that although we are territorially nearly as large as Europe, we have only twenty-three thousand miles of railway as against over two hundred thousand in that continent, it will be recognised that we have far to go before we can hope to see Australia in that stage of development to which she will ultimately attain.

The horse and bullock teams of the pioneering days played a great part in laying bare the possibilities of this country, but they served needs and conditions which have long since ceased to be up-to-date. The example, however, was a worthy one, and we would be wanting in the progressive spirit of our forefathers if we failed to take advantage of the newer forms of locomotion which are at our disposal.

The whole position is that if we were forced to wait until adequate railway facilities were available to open up the vast spaces of the interior, the outlook for Australia would be more than unpromising. The huge cost involved in building a railway line (approximately £10,000 per mile) is one reason why we must look elsewhere for additional transport facilities. The motor truck is no longer a theoretical proposition, its value has been demonstrated on countless occasions. The work it has done, and is doing, in America and England stands out as a shining example for Australia to follow. Motor trucks served England nobly during the railway men's strike, and in America they are proving a serious competitor to railways and tramways. It need not be anticipated that the latter event will happen here, at least not for many years. The lack of extensive settled districts and the fact that there is ample scope opening up the remote inland areas will ensure that motor transport will be an adjunct and not a competitor of our railway and tramway systems.

* * *

Allotting the Blame.

An unfortunate happening of recent date, in which the driver of a motor car was concerned, has given rise to an illogical and unjust outcry against motorists generally. It is altogether unreasonable to assert that motor drivers, as a body, have less thought for the welfare of humanity than any other class in the community. If we examine practically any avocation we will find that its record is dimmed by a number of happenings which perhaps could be classed as "avoidable," but neverthe-

138 Miles Per Hour

Mr. K. Lee Guinness (K.L.G.), driving a 12-cylinder Sunbeam on Brooklands, was clocked to cover a flying half-mile at the phenomenal speed of 138 miles per hour.

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Plugs.

less have not been regarded as evidence that that particular section deserved the censure of the whole community. The regulations governing motor traffic in New South Wales are probably as strict as in any part of the world, and out of the many thousands who are actively engaged in that calling the number required to answer for even trifling breaches of the law is exceedingly small. Probably if the whole subject were reviewed it would be found that the difficulties under which motor drivers ply in the crowded, and in many cases, narrow, winding streets of Sydney and suburbs, makes the record of comparative freedom from accidents one to marvel at. It is a notorious fact that pedestrians consider they have unlimited right to the use of the road—a right which they exercise more in thoughtlessness than in open defiance of the requirements of others. When one changes his environment from a pedestrian in a busy city to riding in a motor car through the same streets, he is able to appreciate the difficulties of the situation. In a community where the rights of all are of equal moment, it serves no useful purpose to encourage hostility to one section for isolated happenings such as occur from time to time.

* * *

One Thousand Miles Alpine Trial.

The Mother State has reason to feel proud of Mr. A. V. Turner's fine performance in the thousand miles alpine trial arranged by the Royal Automobile Club of Victoria. He was the only competitor from New South Wales and he acquitted himself with highest distinction in a test that proved one of the most severe ever promoted in any part of the world.

Mr. Turner has already notched so many victories in endurance contests that filling first place becomes more or less a habit with him. He won the last Sydney-Melbourne race, and has landed the bacon in many other competitions.

Mr. Turner is back again at his desk in Castlereagh Street, Sydney, showing little evidence of having just emerged from the strenuous test in Victoria.

* * *

Royal Automobile Club of Australia.

At the annual meeting of the Royal Automobile Club of Australia on December 8, a lengthy discussion took place on the question of accidents. It was the consensus of opinion that the public required

considerable education to see things as motorists see them, but nothing in the nature of a practical scheme towards educating them was formulated.

It was pointed out that pedestrians quickly readjusted their viewpoints when they became the proud possessors of motor cars, but as nobody came forward with a proposal to supply every member of the community with a car that channel for conversion vanished.

The finances of the R.A.C.A. were shown to be in a healthy state. The assets exceeded the liabilities by close on £11,000.

Officers and Committees appointed for the ensuing year were as follow:

President, Sir Samuel Hordern (unopposed); Vice-Presidents, P. A. Oatley, D. M. Cooper; Hon. Treasurer, A. J. Christie; Hon. Secretary, J. H. Harris; General Committee, H. Daniell, W. Epps, G. C. Hamilton, J. A. Minnett, H. T. Nock, C. O. Sherwood, J. A. Wilson; Election Committee, A. S. George, E. D. Gray, W. C. H. Lippman, P. A. Datley, Fred. Walsh; Hon. Solicitor, E. P. Simpson; Hon. Architect, H. R. Minnett; Hon. Auditor, A. J. Taylor; Hon. Electrical Engineer, J. E. Donoghue.

The General Committee met and made the following appointments: Finance Committee, James Kell, E. D. Gray, W. C. H. Lippman; House Committee, Wm. Epps, A. S. George, W. C. H. Lippman, W. J. McKenney, R. V. Minnett, P. A. Oatley, J. A. Wilson; Roads and Tours, W. E. Arnott, D. M. Cooper, G. F. Hill, R. V. Hodgson, W. J. McKinney, J. A. Minnett, P. A. Oatley; Press and Parliamentary, D. M. Cooper, R. V. Hodgson, W. J. McKenney, Fred. Walsh, J. A. Wilson; Technical and Library, W. J. McKenney, Wm. McNeil, C. A. Mulholland, B. A. Platt, C. O. Sherwood; Entertainment Committee, R. G. Anderson, P. S. Arnott, Rowley Bull, H. Daniell, H. T. Nock, A. J. Robilliard.

Motorgrams.

The thousand miles Victorian Alpine Reliability Trial gave *Itala* cars an opportunity to prove their worth for reliability, economy and speed, which, as already mentioned, they made full use of.

Ex-Traffic Superintendent Edward is very much in love with his car, so much so that he has taken the necessary steps to ensure nobody else of an envious disposi-

tion making off with it. He has a motor car lock—the Perry lock—which consists of a key in the revolving driving wheel attached to his car, and as the car cannot be guided without it, it answers the purpose effectively. Some wag might suggest that it would not be a bar to a thief who desired to go "straight," but in that case no lock would be required at all. The Perry lock has been placed on the market and is highly regarded in America.

In view of the prevalence of eye trouble, owing to the presence of dust from tarred roads, "A Surgeon" in *The English Motor* offers this advice: (1) Do not expose the eyes to sudden differences of light; (2) do not read for any length of time while travelling; (3) protect the eyes from impure air by means of suitable glasses; (4) *en route*, bathe the eyes with cold water; (5) never rub the eyes with the fingers, and as soon as possible bathe with boric solution.

Attention to these points will help considerably to keep the eyes efficient and in comfort and beauty.

The New 13.9 Renault.

Renault products are so well known on the Australian market that there is little need to elaborate on them in these columns.

Louis Renault built his first automobile in 1895. He was then twenty-one years of age, and already captivated by the idea of automobile locomotion, conceived and put into execution his idea of a light car. To his mind the motor car should not be reserved for the favoured few, not for specialists only, but for easy management and within reach of all. From that time this thought alone has been uppermost in all his ideas; to make something simple, solid and lasting. Since 1895 the products of the Renault factory have been recognised throughout the world as being synonymous with quality and reliability, and it is a well-known fact that any manufacturer who has been making the same product for a number of years has necessarily far greater experience, and is capable of producing a finer article than others who have only recently entered the field.

The sturdiness of construction, simplicity of design and control, and economy of operation, are outstanding features of the new 13.9 h.p. car. Owner-drivers are consistently obtaining from 30 to 35 miles per

gallon of petrol, and over 1,000 miles to the gallon of lubricant.

As indication of the car's behaviour under local conditions is provided in the 1,000 miles Royal Automobile Club of Victoria's trials recently concluded.

The trial was the most severe ever held in Australia, and included two hill-climbs, on formula (50 points each); petrol consumption, on formula (100 points), and reliability (800 points).

The Renault won:

First prize in class A. Private owners, for cars up to 2,200 c.c.

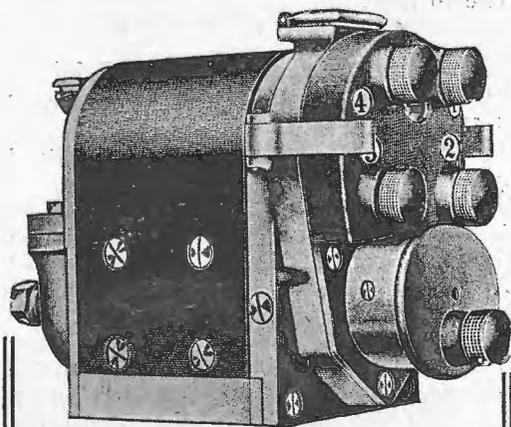
Sixth place in general classification, obtaining 923 out of 1,000 points, as follows:

Petrol consumption, 84 points; hill-climbs, 62 points; reliability, 777 points.

Petrol Consumption: Over a 200 miles course, and weighing 27½ cwt., the Renault did 32½ miles to the gallon, and maintained a speed of 19 miles per hour during that test.

Oil and Water: Only three-quarters of a gallon of oil was used during the whole run, whilst only two gallons of water were added to the radiator.

Reliability: The Renault scored fifth



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place in this classification, with 777 points out of a possible 800, and 18 of the lost points were deducted only owing to a miscalculation in time of arrival on first day. In reality, only five points were lost on account of reliability, and these were for a cracked leaf in a front spring.

Throughout the 1,000 miles the car was not touched with a spanner.

The same Renault car was loaned to the Royal Automobile Club of Victoria to assist in the mapping out of the alpine route, and covered this strenuous course twice within a month. It will be readily recognised that the car put up a wonderful record for durability and efficiency.

These brief facts we consider sufficiently emphasise the reliability and economy of the Renault.

The coachwork is best quality finish throughout, colour to suit purchaser, complete with electric lights, horn, speedometer, spare wheel and tyre and tool kit.

Boyd Edkins Limited, the agents for Renault, are so convinced that the quality of the post-war products of the Renault factory is fully equal to their generally recognised pre-war standard, that all chassis supplied by the Company are warranted to be free from defects in material and workmanship, under normal use, for a period of three years.

A large and comprehensive stock of spare parts is carried, and the firm will be

pleased to supply further particulars, or arrange demonstrations.

Expansion of Business.

Through expansion in trading, R. N. Bubb, "The Motor Accessory House," recently moved from Elizabeth Street, Sydney, to more convenient and commodious premises at 4 and 6 Wentworth Avenue.

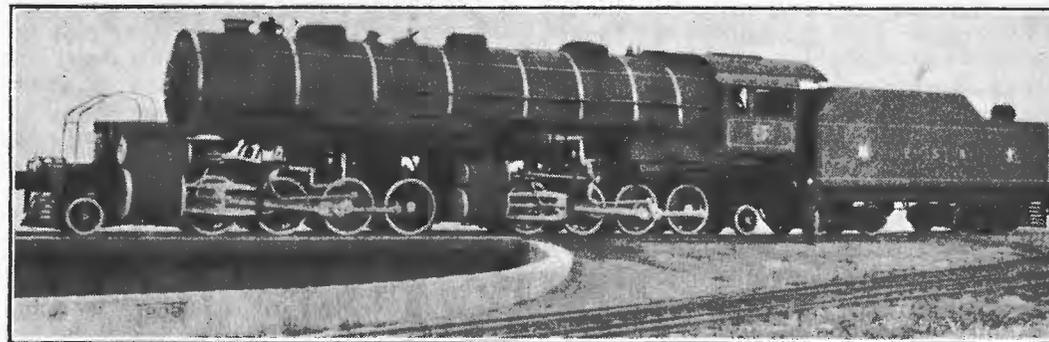
A representative of *Sea, Land and Air* recently visited their warehouse and found a number of interesting accessories for motor cars and trucks, including spark plugs, lamps of all descriptions for burning oil, gas or electricity, petrol savers in several varieties, including the popular A.A.A., which has been doing so well in the recent reliability trials.

The Ford owner is specially catered for with a number of novelties, which make that very popular car more efficient; the Master Auxiliary Front Radius Rod, the Simplex Foot Accelerator, and the Foot Rest Low-gear Holder, were also noticed.

Among numerous other lines there are running board mats, either rubber or fibre, with or without N.P. frames, N.P. foot-board grids and mud-guard grids; numerous polishes and all the necessary accessories for repairing tyres and tubes.

We are sure a visit to the above address in Wentworth Avenue will be both interesting and profitable.

WORLD'S LARGEST LOCOMOTIVE



The largest locomotive ever shipped from the United States of America. This mighty engine was built by the American Locomotive Company at Schenectady, for the Pekin-Suiyuan Railway—one of China's most important lines—constructed and operated entirely by Chinese. Locomotive and tender are 95 feet long, weigh 320 tons, and develop 3,000 horsepower. When in service it will be the largest in the world outside of the United States of America.

VACATIONING BY MOTOR CAR

IN America one of the most popular ways of spending a vacation is to tour some beautiful region in a motor car, going and stopping where fancy dictates, camping in quiet valleys, and getting far away from the usual haunts of men.

Other things being equal, the man who drives a motor car is likely to live longer than the man who does not.

The last century has seen a great increase in the number of indoor workers. Factories and offices are larger and more numerous, and the people who perform their daily tasks in them live a very restricted life so far as physical exercise and fresh air are concerned.

To-day people in all civilised lands are taking more and more account of the value of human life, and therefore of good health. The dissemination of information and propaganda relative to the maintenance of vigour and the elimination of disease are everywhere under the supervision of the government, so important are they.

The motor car has undoubtedly conferred a great boon on all indoor workers. In the first place, it permits the motorist to take full advantage of even a short period of spare time which is not long enough for walking or for other diversions. In a motor car the city dweller can reach the open country in a few minutes.

The greatest benefit of the motor car is its gift of fresh air. The car can be used nowhere but in the fresh air, and the resulting good done to millions of people throughout the world is incalculable.

Further, the motion of the car gives an appreciable amount of exercise; the action of the heart and the breathing are quickened, and the increased amount of oxygen taken into the body is especially valuable to those engaged in sedentary occupations. Exercise is most beneficial when it is pleasurable, and every one who has ever ridden in a motor car knows the enjoyment of swift and smooth motion, the refreshing air rushing against the face, and the contentment of mind which comes from the contemplating of distances.

Another benefit of motoring is the change of scenery afforded. It has long been an

accepted truth that an invalid or one recovering from an illness is improved by change of scenery. This is due to the patient's mind being turned from the introspective brooding on his own troubles and worries to the more tangible evidences of the soundness of things in general. The natural and injurious morbidity of the sick and overworked is alleviated.

The benefit of new surroundings is just as noticeable in the case of persons who are in good health. The business man who works indoors all day, and who is not able or is disinclined to take the physical exercise requisite to the maintenance of good health, is refreshed and strengthened by even a brief change. This can be most easily accomplished by means of the motor car.

Eye strain is known to be relieved by walking, which relaxes the tension of the eye muscles and relieves the headache which often results from long-continued work in poorly lighted rooms. This relaxation is also effected by motoring.

There are as many ways of using a motor car as there are people using them. It is a common sight nowadays to see literally hundreds of cars being used by entire families on Sundays and holidays, at picnics or on tours. The family is kept together during the entire day, and all return home tired, hungry, contented and healthier.

Business men use their cars as a matter of convenience, and by so doing save time and increase their efficiency; they also receive actual physical benefit from the slight exercise and the opportunity to get fresh air into their systems. It is superfluous to repeat the statement, so often made, that the motor car enables the business man to transact his business in the city and live in the country, with all the attendant benefits.

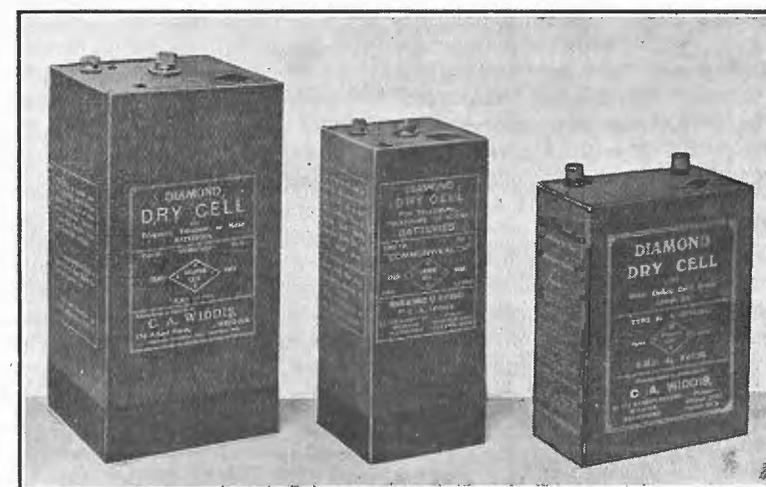
As a daily mode of transportation, as a means of touring through beautiful and restful scenery, and as an indispensable adjunct of camping and vacation trips, the motor car has no equal. And all of these uses increase good health and make us more efficient for the performance of our daily tasks.

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THE H.M.S. *Renown* successfully negotiated Suez Canal on the occasion of the Prince of Wales' recent visit to India. Those responsible for the arrangements experienced a good deal of anxiety owing to the fact that the warship was the largest vessel that has attempted the passage through the Canal. However not the slightest difficulty was experienced, the huge battleship passing through as easily as an ordinary mail steamer.

Oil Replaces Coal.

The contract for converting the Cunard liner *Berengaria* (former *Imperator*) from a coal to an oil fuel vessel, has been undertaken by the English firm of Messrs. Armstrong, Whitworth. The *Berengaria* is the third largest vessel in the world, and on a recent trip from Southampton to America the chief steward had no less than two thousand passengers to cater for.

The liner is equipped with swimming bath, gymnasium, winter gardens, orchestra, bank, libraries and other features which make her a veritable floating city.

Ex-P. & O. Director in Australia.

Mr. I. M. Shields, who recently resigned from the position of managing director of the P. & O. Company, arrived in Australia a few weeks ago. With Lord Inchcape and Mr. F. Ritchie he was one of the three managing directors of the Line, and he is now enjoying a well earned holiday after a long and strenuous business career. In the eighties Mr. Shields was actively engaged in working for the Company's interests in Australia. He afterwards went to India, where he eventually became superintendent for the Line, with headquarters at Bombay. Subsequently he

proceeded to London, where he rose to the high position already mentioned. It is probable that he will be succeeded by Mr. F. C. Allen, one of the assistant managers of the Line, who is another man of outstanding ability.

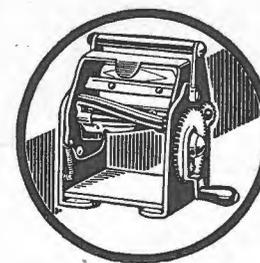
New Pier for Port Melbourne.

The Melbourne Harbour Trust proposes to increase the berthing accommodation in Hobson's Bay by the erection of a new pier at Port Melbourne.

The Chairman of the Board of Commissioners, in making the announcement, said the structure was necessary in order that the port might be able to accommodate the large new ships likely to visit Australian waters in the near future. The new pier will be larger than the one opened to passenger vessel traffic in 1915; its dimensions being, length two thousand one hundred and ten feet, width one hundred and ninety-one feet. Provision will be made for installing electrically operated travelling portal jib cranes on both sides of the wharf if required, and there will be four berths for deep-sea steamers. The undertaking is estimated to cost £492,880, and Australian timbers will be used throughout.

"Eurimbla" at Sea.

The *Eurimbla*, the first big steamer to be built in South Australia, was tested on a double course of thirty miles in St. Vincent's Gulf recently, and she more than fulfilled expectations. She is a vessel of six thousand six hundred tons weight carrying capacity, and one of the four which Messrs. Poole & Steel contracted to build at Port Adelaide for the Commonwealth Government. Naturally a good deal of interest attached to such an event, and



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at the conclusion of the trip, which was highly satisfactory in every way, congratulations were showered upon all concerned in the turning out of such an excellent job.

Safeguarding Ships.

Shipping masters have few complaints to make in regard to the lighting arrangements along the Australian coast, but they freely admit that the lack of fog signals on certain dangerous points constitutes a menace to shipping. Wilson's Promontory, situated on the southern extremity of the mainland, and surrounded by small island groups through which vessels must navigate, is at present not equipped with a fog-signalling apparatus of any kind. Consequently navigation is fraught with considerable danger during foggy or thick, rainy weather.

The usual procedure is to slow down or stop until the weather clears, which, of course, involves shipowners in considerable losses annually.

Officially, it is explained that the lack of safety signals is due to the fact that previous experiments with fog signals were unsatisfactory. The numerous hills surrounding the point caused the sound to reverberate and echo repeatedly, thereby making it more of a menace than an aid to passing ships.

Mariners are also of the opinion that a wireless direction-finding station should be erected on Cape Otway in addition to other points along the coast. Vessels fitted with wireless would then be in a position to ascertain their position at any time and in any weather. Such stations established on the American and British coasts have given excellent results. On a recent voyage to Australia the steamer *West Mahwah* steamed one thousand three hundred miles through a thick Pacific fog, during which time no stellar or solar observations were possible. By using the wireless compass in connection with radio stations ashore, however, the position was ascertained without difficulty at frequent intervals. Happenings like this illustrate the immense value of the wireless apparatus for safeguarding ships under difficult circumstances.

War-Time Incident Recalled.

In the Practice Court in Melbourne recently, Mr. Justice Cussen delivered judgment on an application by Mr. Latham

(representing His Majesty the King), under instructions from the Federal Crown Solicitor, that the German steamer *Pfalz*, six thousand seven hundred tons, should be condemned as a prize.

The vessel was leaving Melbourne in August, 1914, in charge of Wilhelm Kullen, when she was stopped by a shot fired across her bows. Later, on her arrival at Williamstown, the *Pfalz* was seized for the Crown by a Customs officer, an armed Naval guard being placed on board. Subsequently the vessel was requisitioned by the Admiralty, and used in the Allies' service during the war. She was wrecked, torpedoed, and burnt in part, but was reconditioned and transferred to the service of the Commonwealth Government. Mr. Justice Cussen decided that the vessel was a good and lawful prize.

New North Coast Trader.

Messrs. Langley Brothers' new vessel, the s.s. *Dorrigo*, recently made her maiden trip to the North Coast. This vessel is to take up the run of the ill-fated *Fitzroy* in the Sydney, Newcastle, Coff's Harbour and Woolgoolga trade and should prove a valuable addition to the fleet of steamers owned by this Company.

The *Dorrigo* was previously employed in the Island trade, and during the war she was shelled by the German cruiser *Scharnhorst*. The mark made by one shell which penetrated the funnel is still visible. Only her speed of sixteen knots enabled her to escape more serious damage.

The *Dorrigo* is fitted with a wireless apparatus capable of communicating and receiving messages up to a distance of one thousand five hundred miles; palatial passenger accommodation; ample deck space for the convenience of passengers; large and comfortable dining saloon for all passengers; smoke room, lounge, office, card-room and all other conveniences, including bathroom, lavatories, electric light throughout, electric fans, refreshment booth, etc. For the conveyance of cargo ample hold space is provided, and as she will run a regular weekly service between Sydney, Newcastle, Coff's Harbour and Woolgoolga should prove a great boon to shippers generally.

Shipbuilding in Japan.

Three ten thousand-ton vessels are being built by the Nippon Yusen Kaisha at the

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Nagasaki shipyards for use on the European run. During the time of the German submarine menace in the late war, the Company removed superior vessels of the ten thousand-ton type such as the *Kashima*, *Katori*, *Fushimi* and *Suwa* from the European to the North American run in order to protect them from that danger, and their place was taken by ships of six thousand-ton type. It was the original intention of the Company to restore the superior ships to the European run immediately on the termination of war, but this has not been done.

On the other hand, the Company is building three vessels of ten thousand-ton type to take the place of the *Yasaka Maru*, twelve thousand tons, the *Miyazaki Maru*, eight thousand tons, and the *Hirano Maru*, eight thousand tons, which were sunk during the war. The three new ships are under construction at the Nagasaki works of the Mitsubishi Shipyard, and are to be named the *Hakone Maru*, the *Haruna Maru* and the *Asama Maru*. The places of the three ships sunk during the war have so far been taken by the *Kamo Maru*, the *Inaba Maru* and the *Sato Maru*, and these vessels are to be released when the three new ships are completed.

Panama Canal.

The Panama Canal completed seven years of operation at the close of business on August 14, 1921, having been opened to commerce on August 15, 1914. During the seven years of operation the total number of commercial vessels which made the transit through the canal was 13,416. The aggregate net tonnage of these vessels, according to the rules of measurement of the Panama Canal, was 45,869,942. The cargo they carried totalled 51,578,920 tons of 2,240 pounds.

The foregoing traffic was made up of 6,388 vessels, of 21,933,325 net tons, carrying 22,215,402 tons of cargo from the Atlantic to the Pacific, and 7,028 vessels, of 23,936,617 net tons, carrying 29,363,518 tons of cargo from the Pacific to the Atlantic.

CASTAWAYS' CRUISES.

Recent voyages made by mariners of shipwrecked or distressed vessels in small open boats have been reminiscent of similar happenings of many years ago. Two of the most recent instances are the *Canadian*

Importer and the *Columbia River*, the crews of which performed feats of great courage and endurance. To hark back a few years is to learn of a number of remarkable voyages, which only go to prove that the spirit of the sailor has ever been one of ready initiative and grim determination.

When the steamer *Boveric*, of the Howard Smith fleet, broke down in the Indian Ocean in 1902, and was so long missing that her loss was almost universally feared, a fully-manned lifeboat set out for the Australian coast, the nearest point of which was one thousand two hundred miles away. The hardy voyagers completed the journey in twenty-nine days, after suffering most acute privations from a shortage of water and food.

Former Pacific Voyages.

Courageous and marvellous though these feats were, even more wonderful passages in cockle-shells were accomplished in 1887 by the crew of the shipwrecked barque *Afton*, and a century before by Captain William Bligh, after the mutiny on board the *Bounty*. Though the latter covered the greater distance, three thousand six hundred and eighteen miles, between Tofoa Island and the Island of Timor, north of Australia, and the *Afton* covered three thousand miles on their enforced passage between the Lisiansky Reef, in the North Pacific, and Guam in the Ladrone Group, Bligh's memorable voyage was made in a boat only twenty-three feet long, which carried nineteen hands, and covered the voyage in forty-seven days.

That made by the crew of the *Afton* was accomplished by two thirty-four feet boats, manned by ten and nine men respectively, and was completed within a month. The barque was run by McIlwraith, McEacharn Limited, and owned by Mr. David Hunter, of Ayr, whose son is head of the Australian interests of the great shiping firm to-day. Mr. G. Watson, who long ago left the sea for a shore life, and is now resident in Melbourne, was an apprentice on board when the *Afton* came to grief; Mr. Woolcott, who is now chief mate of the Australian coaster *Perth*, was serving as an A.B.

In a description of their long and arduous journey across the Pacific, they stated that nothing was saved from the ship except a little preserved meat, a tin of biscuits, and a small cask of water. The

two boats leaked badly, and the crews were kept continually employed either bailing, rowing, or attending the sails when the wind was fair. Gradually the supply of water was reduced until the daily ration became less than half a pint. Then welcome showers fell, and a fresh supply was secured by using the sails as catchers. After being cramped in the small boats without once sighting land for a full month, the thirsty, hungry castaways landed at Guam, at which place the boats were sold for four hundred dollars (£80).

* * *

One Hundred Miles a Day.

Only one casualty occurred on the terrible journey—the mate accidentally falling overboard. As this voyage of three thousand miles was completed in thirty days, the average speed was one hundred miles a day—a magnificent achievement for boats of the type under such conditions, and one which will probably never be excelled as a triumph of navigation in the trying circumstances.

Anxious to Reach Australia.

An interesting feature of the voyage of the steamer *Surrey*, which arrived at Melbourne from Liverpool recently, was the discovery on board the vessel when a day's sail from port of four youthful stowaways. The boys, whose ages ranged from sixteen to twenty, had hidden themselves in the bunkers while the vessel lay moored at Liverpool, which port she left on October 8 last. The following day they voluntarily surrendered themselves, declaring that they had hidden on board in order to come to Australia, where they hoped for successful careers. They were treated well on the voyage, and on arrival at Fremantle they disembarked and were immediately taken under the wing of the Ugly Men's Association, a body of enthusiastic, but evidently modest men, whose object it is to populate Australia. Apart from rough weather in the Indian Ocean, when the *Surrey* was buffeted by north-westerly and south-westerly gales, and high seas which broke over the vessel, the youthful settlers experienced a voyage unmarred by any untoward incidents.

SPECTACULAR NAVAL MANOEUVRE



A spectacular Naval manoeuvre as viewed from the air. A dozen or more United States destroyers executing a picturesque and unusual tactical manoeuvre on the southern drill grounds of the Pacific Fleet, off San Diego, California. Note the close call from collision of the two destroyers on the extreme right.

[Wide World.]

JUNIOR MECHANICS SECTION

The consistent and increasing demand on the part of a number of our readers has induced us to inaugurate this new section in *Sea, Land and Air*.

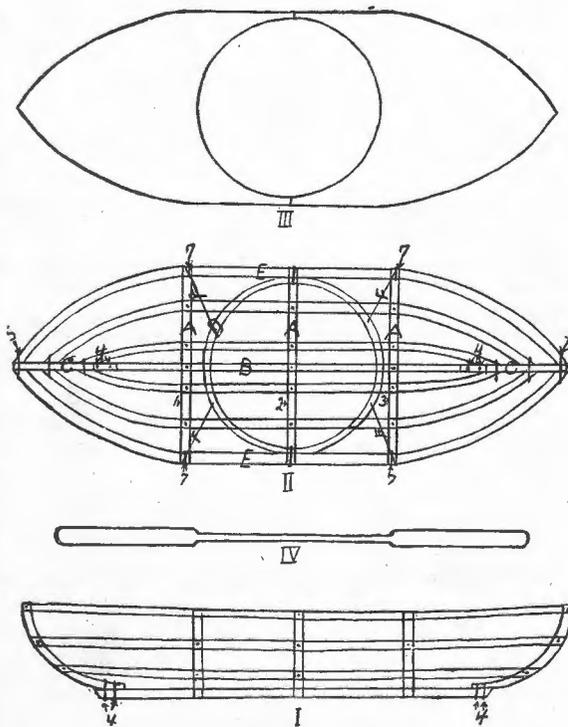
Under the above heading in future will appear items of general interest to the junior mechanic and experimenter, who will be enabled to construct and experiment at home for very little expense.

In order to keep this section as bright and up-to-date as possible we seek the co-operation of our readers. By contributing simple constructional and experimental items—written in non-technical language that will occupy space varying from a small paragraph to a full page or more—accompanied by diagrams and illustrations, readers will materially assist. All contributions will receive our most careful consideration and, if accepted, will be paid for on publication.—Ed.

HOW TO BUILD A CANOE

SECURE a board four feet long and two inches square (B), and four bicycle rims (A, C, D). Cut three of the rims in half and bolt the rim (2), Figure II., in the middle of the long board with a quarter-inch bolt two inches long. Bolt the two other rims (1 and 3) one and a half feet on both sides from the rim in the middle (2). Take one-fourth of a rim (C), Figure II., and bolt it on the end of the long board (B), Figure II., with two bolts (4). Do the same with the other end.

Next take a board nine feet long, three inches wide, and one quarter of an inch thick. Bolt it to the bicycle rim (C) at the very top with a quarter-inch bolt three inches long (5), Figure II. Bend this board (E) around until it meets the rim (1) and bolt it there (7). Then bend it to the rim (2 and 3), and bolt it at these two places. Bend it to the end rim (C) and bolt it there (5). Put one on the other side the same way.



Then go down four inches and bolt a board there, run it all the way, the same as before. Put one on the other side, too. Go down four inches again and bolt a third board around it on both sides. Now

you will have three boards running all the way around the canoe, Figure I.

The next thing to do is to bolt the whole rim (D), Figure II., in its place. When you have done that, measure around one foot from the place where the rim is bolted on to the board (E), and add a wire in a hole in the rim and run it to the joint (7), Figure II. Put four wires on the rim and run them to the joints (7).

Now secure a large piece of canvas and cover the whole canoe, except inside the rim (D), Figure III., and give it a coat of paint.

Now get a board four and a half feet long, six inches wide, and half an inch thick for the paddle. Cut a round handle two feet long in the middle (Figure IV.), and the whole thing is complete.

A USEFUL DODGE FOR "JUNIOR" DRAUGHTSMEN

By F. W. WHYMAN

PROBABLY all juniors have wished, at some time or another, to prepare proper working drawings for a model or a piece of apparatus.

Now for this purpose a certain number of appliances are necessary—a drawing board, tee square, ruler, set square and a pair of compasses will be about the minimum. The compasses and ruler will almost certainly be found in the workshop, but the drawing board and tee square (costing at least seven or eight shillings) will for financial reasons remain a luxury only to be dreamed of. How

the writer overcame this sad state of affairs is depicted in Figure I. The wooden strip is secured to the sheet of paper by means of flat-headed drawing pins (shown in dotted lines). Resting against this is a T-square. For

small work an ordinary set square may be used, but for the usual run of work the wooden skeleton frame shown in the drawing is the best. This arrangement takes the place of the familiar tee-square quite satisfactorily. The only points about this are that the "business" edges of the stock, blade and strip must be true, and that the angle the blade makes with the stock must be a right angle. The set square or tee-square, whichever you choose to call it, must be fitted together very rigidly, the halved joints being

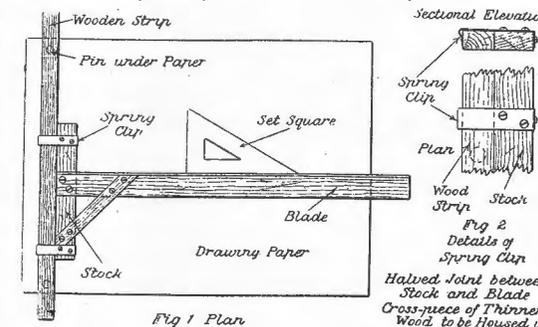
either glued and nailed or screwed—the latter being preferable. If the blade could be made of celluloid or vulcanite, so much the better. A great improvement shown in Figure 2 is that of fitting a pair of spring clips made of hard brass to automatically hold the edges of the stock and the fixed strip firmly together and yet permit of free longitudinal movement. Since no drawing board is used the work must be done on a smooth flat surface; an ordinary table would suffice for the junior's need. If desired the paper

with the strip attached could be pinned down as usual. It is almost unnecessary to add that set squares are used on it in the ordinary way.

With regard to the set squares, the best investment is a 60° celluloid. If this is too expensive wooden

squares are quite cheap, but beware of the bevelled edge type. Quite satisfactory set squares could be made at home out of thin fretwood, celluloid, or perhaps old gramophone records. The writer has never used the last-mentioned material, but it would probably be quite as good as vulcanite.

In conclusion it may be stated that the "tee-square and drawing board" part of the equipment cost the writer exactly fourpence—a sum that would not be grudged by the most impecunious of juniors!



SIMPLE EXPERIMENTS IN ORGANIC CHEMISTRY

By GEORGE A. MacELREE, Jr.

FOR many years, the man or boy who indulges in chemistry for its amusing or educational value, has always stuck to experiments in *inorganic* chemistry, because he believes them to be simpler and of greater interest than any others. However, this is not the case. *Organic* chemistry furnishes some of the

most interesting experiments known. Of course, real organic chemistry is a very difficult subject, but you do not need to know all about its principles to do some simple experiments; any more than a man lighting a fire needs to understand the principles of combustion.

As most people know, one of the greatest

uses of organic chemistry is the preparation of synthetic perfumes and flavours. Perhaps one of the easiest and most interesting of these for the dabbler is the making of what is termed "artificial oil of wintergreen." This compound is in general use at the present day and can be bought in all drug stores. However, it is far more interesting to prepare it in the home laboratory.

Artificial Oil of Wintergreen.

To about two ounces of methyl alcohol, which is commonly called wood alcohol, by reason of its being obtained by the destructive distillation of wood (and this kind can be bought without a prescription), and about as much salicylic acid as will go on a threepenny piece, add one cubic centimetre of sulphuric acid and then heat. Allow this to boil for several minutes and the thin colourless liquid will gradually turn brown and become oily in nature. Now cautiously smell the end of the tube and notice the distinct odour of wintergreen. When the liquid has become cool, any extra salicylic acid will crystallize out and leave a clear brownish solution. In the presence of the sulphuric acid, the salicylic acid and alcohol combine to form methyl salicylate, or "artificial oil of wintergreen," which is in common use to-day, as a flavour and a medicine.

Artificial Extract of Vanilla.

Take equal quantities of carbolic acid and chloroform. Heat this in a test-tube and then add half as much by weight of sodium hydroxide, any other alkaline hydroxide will serve as well. Raise this mixture to the boiling point, then let it cool. A white solid will fill part of the tube. Separate this from the liquid, and heat it with wood alcohol. This will form anisic aldehyde, which is the perfume of hawthorn blossoms. Save the liquid, which is very fragrant, and to it add dry acetic acid. Cumarin, the perfume of the tonka bean, will result. This is much used as a substitute for vanilla.

An Experiment in Combustion.

One of the most interesting experiments in organic chemistry, after synthetic flavours is one of combustion. This experiment can be done with little or no danger, providing the proper care is given acids. As the reaction is accompanied by some heat, it is best not to hold the tube in the hand.

Into a six-inch test tube pour about one-half inch of alcohol, it does not matter what kind, and to it add an equal amount of sulphuric acid. As the acid is the heavier of the two, it will sink to the bottom. Now drop into the tube several crystals of potassium permanganate and wait a little while. In about a minute, sparks will begin to fly within the tube and a veritable sham battle will ensue, accompanied by a loud crackling. The flames will be so violent that they will appear to penetrate the glass and appear without the tube. This action will continue for quite a time. Do not attempt to empty the tube before action has ceased, because some of the alcohol might take fire and a catastrophe result. The effect will be heightened if this experiment is performed in a dark room.

Spontaneous Combustion.

An equally interesting experiment is one of spontaneous combustion. Mix equal quantities of common sugar and potassium chlorate, and place this mixture in a basin or other high-walled container, as the action is vigorous when it starts. Now cautiously add a few drops of sulphuric acid to this and stand away. In a few seconds a loud crackling will be heard and the basin will appear to be in a state of eruption. Suddenly a purple flame will dart up with all the brilliancy of flashlight powder, and will as quickly die down. This is caused by the sugar robbing the chloric acid of its oxygen, and burning up the carbon. Naturally this theft makes a strong action and produces heat. This heat serves to ignite the carbon, which burns with great brightness. The violet colour of the flame is due to the potassium chlorate.

These are but a few simple experiments dealing with this wide and almost inexhaustible field of experimentation. For when organic chemistry is properly studied, it is not hard to imagine imitation ivory being made of formaldehyde and cheese, to realise that the phonograph record material may be made out of the interaction of formaldehyde and carbolic acid, that exquisite dyes and perfumes are obtained out of a pot of tar, and that the worst of poisons and the best of medicines are based upon a lump of coal. All these interesting things are possible with organic chemistry, which, I think you will agree with me (concludes the writer in *Science and Invention*) is a very interesting and entertaining branch of science.

A BOOK FOR EVERY BOY



Mr. Addyman—the author—recently wrote:—

"A certain lady of my acquaintance once told me that every time I entered her house it was a signal to her boys 'to make a mess all over the place.' That was a long time ago, and though I have never yet found a certain cure for the 'mess' I managed to stop it—more or less—from being 'all over the place' by suggesting that boys should have a workshop of their own. . . . Since then I have written this book."

In this popular book the author has arranged his description of things in such an order that one piece of work suggests the next and helps to explain it.

The whole contents are written in simple and interesting language, and are profusely illustrated with diagrams and illustrations for the experiments mentioned.

THIS BOOK WILL INSTRUCT AND ENTERTAIN YOUR BOY.

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WIRELESS INSTITUTE OF AUSTRALIA

NEW SOUTH WALES DIVISION

A GENERAL MEETING was held at "Wireless House" on November 22, at which there was a large attendance of members.

Mr. J. F. Wilson occupied the chair.

After the reading of the minutes, Mr. Maclurcan drew members' attention to certain alterations in the competition procedure. These alterations had previously been broadcasted by Mr. Maclurcan during transmission on the previous Sunday. It was very gratifying to note that many members received the broadcast verbatim.

The Chairman then called on Mr. Mordin for an address on "Automatic Telephony." After introducing the subject and giving, with the aid of large paper diagrams, a brief sketch of the various machine switching automatic telephone systems, the lecturer entered upon a more detailed account of the "Relay System" of automatic telephony.

With a working thirty-line "Automatic Relay System" switchboard in the lecture room, on which actual telephone connections were set up, he very clearly demonstrated the operations of the system.

Various members of the audience were enabled to converse with each other, while the remainder observed the effect upon the apparatus of the various actions which delineate the stages of an automatic telephone connection, e.g., taking off receiver, dialling, the reply of the called subscriber, the release of the connection, etc.

The meeting was impressed with the speed and reliability of the apparatus employed in the "Relay System" due, as might be expected, to the total absence of mechanism with its attendant mechanical inertia.

After surviving a severe cross-examination by members of the audience, Mr. Mordin was accorded a sincere vote of thanks, which terminated an enjoyable evening.

Another General Meeting was held at "Wireless House" on December 13, 1921, Mr. J. F. Wilson presiding.

Before proceeding with any business the Chairman drew the attention of members to the presence at the meeting of Mr. C. P. Bartholomew, who had recently returned

from a ten months' trip to Europe and America on business. The Chairman requested some of those members who were better acquainted with Mr. Bartholomew's long connection with the Institute to speak, and Mr. Renshaw and Mr. Maclurcan supported the Chairman's words of welcome, Mr. Maclurcan describing Mr. Bartholomew as the "Father of Experimental Wireless in Australia."

Mr. Bartholomew responded.

The Honorary Secretary then read the minutes of the previous meeting.

The election of the following members was then proceeded with.

Members: H. A. Warden, Public School, Mungindi, N.S.W.; G. McMahon, Ariah Park, N.S.W.; P. L. H. Sewell, 12 Dillon Street, Paddington; A. B. Cummings, Atherton, North Queensland.

Associate Members: P. Parker, Weldon Street, Burwood; J. S. Barling, 287 Stanmore Road, Petersham; J. McMahon, 137 Sutherland Street, Paddington; J. P. Cureton, "Maruna," Burwood Road, Burwood.

Mr. Maclurcan then stated that the results achieved in the Wireless Telephone Competition had been more than satisfactory, and exhorted those members participating to do their best on the occasion of the final transmission, Sunday, December 18, 1921. The results will be announced at the General Meeting on January 10, 1922, and published in the February issue of *Sea, Land and Air*.

The Chairman called on Mr. S. N. Newman, who read a very interesting paper on "European Signals Amplified by Twenty Valves," which was illustrated with blackboard diagrams. At the conclusion of the paper questions were asked in regard to amplification which resulted in a fund of useful information being gleaned by the members.

Mr. Newman's paper will be published in our next issue.

The meeting closed at 10 p.m. The subject set down on the syllabus for the meeting on January 10, 1922, has been altered on account of Mr. F. Basil Cooke being away in Queensland, and a series of "Short Papers by Members" has been substituted as the business of that meeting.

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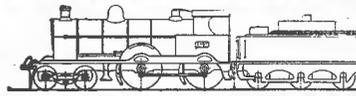
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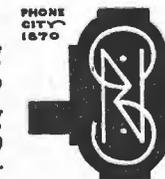
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SOUTH AUSTRALIAN DIVISION

The Monthly General Meeting was held at Alfred Chambers, Currie Street, Adelaide, on Wednesday, December 7. There was a large attendance. Mr. Hambly Clark presided.

The minutes of the previous meeting were read and confirmed.

Two applications for membership were read and approved.

It was decided to forego the January meeting, owing to the number of our members who will be away for the Christmas and New Year holidays. The next general meeting will, therefore, be held on Monday, February 1, 1922.

Owing to the increasing numbers of members, it is desirable that a larger room be obtained for meetings. The next meeting will therefore be held at new premises, and an advertisement will appear later in the

local press advising members of the change of locality, previous to the next meeting.

At the close of the business a lecture on "A Wireless Receiving Station" was given by the Hon. Secretary, Mr. C. E. Ames.

Mr. Ames explained the different types of aeriols, how to obtain a good earth, and also the use of a counterpoise.

He explained the construction of Spider Web Inductances and Burndept Coils with condensers for tuning, and different methods of mounting these coils.

A few brief remarks on the working of both Crystal and Valve Detectors, and the importance of the proper potential on the plate of the valve concluded the address.

A hearty vote of thanks, moved by Mr. Dunstone and seconded by Mr. Bland, was accorded by acclamation.

QUESTIONS AND ANSWERS

G.S. (Western Australia).—Question (1): *Is it possible to receive wireless telephone signals using a detector such as Galena, with other instruments shown in diagram, from a transmitting station twelve miles away?*

Answer (1): Yes.

Question (2): *How much would the receiving range of my set be increased by raising the aerial twenty feet higher, and what should be the range of the receiving set shown in the diagram?*

Answer (2): Your receiving should be increased by approximately twenty-five per cent., and the receiving range of the set shown in diagram should be about five hundred miles at night.

Wireless (Mosman, N.S.W.).—Question (1): *Will you please give me the design of three wireless receiving sets?*

Answer (1): We refer you to a publication entitled "The Wireless Experimenters' Manual," by Elmer E. Bucher, obtainable from all leading booksellers. This book contains data regarding the design of wireless receiving sets covering all wave lengths. If you have any difficulty in obtaining the book communicate with us again.

D. J. Harkin (Salisbury, S.A.).—Question (1): *What would be the approximate range of a cabinet wireless receiving set comprising: Two rotary variable condensers, variometer tuner, loading coil, crystal detector, two thousand ohm*

'phones, and an aerial one hundred feet long and forty-five feet high?

Answer (1): With such a set you should easily receive signals from the following radio stations: Adelaide, Melbourne, Esperance and King Island, as well as a number of ship stations.

Question (2): *What is the salary of a wireless officer in the mercantile marine?*

Answer (2): The salary of a junior wireless officer is £12 per month. An officer in charge of a ship station with twelve months' experience receives £14 per month, after which the salary is increased £1 per month per annum, rising to £24 per month. In addition to salary, first-class accommodation and food is supplied on board all ships.

B. A. (Ashfield, N.S.W.).—Question (1): *Would a two-wire inverted "L" aerial, one hundred and twenty feet long, give better results in receiving than a single-wire of the same length?*

Answer (1): Yes.

Question (2): *Is it possible to receive radio-telephone signals in Sydney which are transmitted in Melbourne?*

Answer (2): As announced on page 648 of the last issue of *Sea, Land and Air*, radio-telephone concerts are radiated from Melbourne every Monday evening. Although the power used is only half K.W., it is possible to receive the signals in Sydney by using several stages of amplification.

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IMPORTANT

With the advent of direct wireless between Australia and England, together with the rapid expansion in wireless as applied to shipping, a great number of positions as Wireless Officers will be available for successful students of the Marconi Schools from time to time. In your own interests it is advisable that you enrol as early as possible, in order that you may be able to accept one of these positions as they occur.

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TOPICAL INTEREST

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