substitution of green for
n for this is based on
on sense. Suppose that the
t danger, showing the red
y accident, or malice the
he lamp had been broken,
would then appear white
n would enter the block
clear track. For this rea-
aphore when dropped to
es its red glass from in
white lamp, allowing the
to place the red.
a green or the red lens is
signal of course shows
that this code does not recog-
s a signal this color ef-
ps the train.

for Single Track

systems apply, of course,
cks, but there is another,
ious, which makes it peo-
a single-track road. This
s of the "staff," and is an
rantee against any form
nvolving two trains, al-
hes not safeguard in the
nage to the track. It re-
ctric circuit, no wires, and
or towermen.
is simply a small round
k, about twelve inches
resents a certain section
about five miles. Posses-
taff allows the engineer to
k, and he can be opposed
ke no other train, because
ent on that block is im-

ll receive the staff at A,
right to run to B, where
elivered and another staff
further right to C, and
arrival at B, the staff is
the next block, the train
wait until it is received.
olutely safe, the operation
der this system is slow,
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since the idea was im-
England, several years
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s of single track, and its
fore, restricted to "gant-
places on a double-track
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is equal, or nearly so, it
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by railroads, there is no
depart from the central
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ains as here pictured may
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that the movements of
reported to the despatch-
k system does not des-
it merely protects them.
he system employed be
tween the train movement
tured in the train-sheet.
ontrolled manual every
rted by the towermen on
to each block. When mov-
automatic system towers
uent, but, as the operation
will always necessitate
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h offices, the operators
rting the passage of the

note of the block system is
nsuring of a check on the
after many years, a singu-
on to the attitude of Rose
Baltimore, Maryland, the
f the famous-camel-back
and a great railroad man
who really lived fifty years
me.
tified with one oft-quoted
will not only make a rule,
not to break it, and disci-
he does, but I will try to
that it will be impossible
reak it if he wants to."

Plague

of fleas, particularly the
ch live on guinea pigs,
en. It was found that all
ransmit plague except the
d in that one instance all
failed. The cat may be
in so far as it might carry
at fleas which have jumper
er deserting the body of a
has died of plague. The
to carry a shipload of cats
kill the rats is only one of
bizarre ideas suggested to
plague, for a few hundred
make little impression on
of rats in a country larger
ited States.
ight is against the rat, for
is one belonging solely to
. If no rats are imported
from infected ports there
plague imported, and if
o rats in a healthy port,
e little or no danger, even
ed rat does sneak ashore.
he fewer rats there are,
the danger. It is money
to buy up all the rats for
due precautions being taken
the fraud of bringing in
other towns for the local
every householder and
arehouse would take up the
clear his own premises for
rotection, the expense of
ity of the danger would be
If plague does come, of
crusade should be extend-
leas.
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ensures safety. A plague
p is not disinfected if we
rats in it and not the fleas.
reported by Major Moor-
that we need have no fear
if we work along these

tful if the disease can ever
demic in America, for it
finitely placed in the class
a and yellow fever—both
vere once widespread ter-
now are subdued by the
sanitation. But the duties
of health and health offi-
ow extended because they
ry for our very existence.
health officers do their full
are supported by public
d laws, and liberal appro-
ll three of these diseases
others will subdue us. The
eginning made by Seattle
ince the world that it will
st spot on earth to spend
o. 1909.

Wireless Messages Between Ship and Shore

The modern Transatlantic traveler, who partakes of the news of the world as part of his daily fare, and who, scores or perhaps hundreds of miles from land, exchanges messages of business or friendship with his acquaintances ashore, has a very limited idea of the means and methods employed to thus keep him in touch with the world at large. He doubtless has seen outlined against the sky two parallel wires stretched from masthead to masthead, and a few connecting strands running down the ship's superstructure, and while lounging on an upper deck he may have heard emanating from some small room a series of sharp, rasping, irregular hisses not unlike some monstrous katydid become delirious. All this he may have seen and heard and been dimly aware that it was part of the ship's wireless equipment. He may have heard, besides, somewhat of ether waves and coherers and other terms nearly as meaningless as the dots and dashes of the *international code* would be, but about *the whole* subject there is bewilderment.

It is not the purpose here to describe or explain the mechanical part of wireless telegraphy, about which much has been written, but rather to give a little idea of the human side of the machine, a view of the lives of the men who work the instruments that make these unseen, scarcely comprehended forces of nature to do their bidding.

There are on the American side of the Atlantic several wireless stations which are in touch with the outgoing or incoming steamers for from two to three days' distance from New York. There is one at Sea Gate, Coney Island, one at Sagaponack, L.I., about ninety-five miles from Sandy Hook, two more far at sea, at Nantucket and on Sable Island, and the last outpost far down on the gray Newfoundland coast above the dreaded rocks at Cape Race. In addition to these is the great Cape Cod station at South Wellfleet, Mass., which in conjunction with one of equal power in Ireland, furnishes the daily news bulletins to all ships equipped to receive them from continent to continent.

At Sagaponack

Leaving the railroad at Bridgehampton, the wayfarer in search of the Sagaponack station travels coastward for two or three miles, writes E. S. Clowes, in the New York Evening Post. Passing through Bridgehampton village with its elm-shaded street and white steepled churches outlined against the sky, through a rich farming country with gaunt old houses or the occasional "summer house" nestled restfully amid trees or blinking in the noonday sun, on through Sagaponack street peaceful and wide, with an ancient graveyard set, New England fashion, in the centre, then we begin to hear the murmur of the sea, and to smell its salty fragrance, and we know that the journey's end is near. Long before, visible as it is for miles around, we could see a slender white mast rising far above the highest tree tops. Coming round a turn in the road it is seen entire, surrounded by a network of guy ropes, the whole not unlike the frame of an enormous tent, with the apex over one hundred and sixty feet above the soil.

At the foot of the pole are a few small white buildings, from which thin strands of wire rise to its summit; near the road is a tiny cottage, formerly a "summer cottage," but now the residence of the operators, into which the telegraph line that has accompanied us from the railroad finally disappears. Around about a level marshy land, Sagaponack Lake or Sagg Pond, as the natives call it, stretches away a half mile or more in front; northward are fields of grain or potatoes, dotted here and there with trees and houses; far away a range of low hills of blue in the midsummer haze, the white steeples of Bridgehampton standing out sharply against them. On the other hand, hardly more than a stone's throw of the kind George Washington was said to have made, are the smooth green backs of the sand dunes, then a few rods of yellow sand, and then the endless ocean, flecked with white caps by the summer breeze. A peaceful landscape but bleak enough in winter when the easterly gales are blowing.

Let us suppose we have a message to send. The vessel we wish to reach has sailed about three in the afternoon, so about eight we step inside the office as the small room beneath the mast proves to be. It is a room about eight feet by twelve. A long table on one side of the room covered with meaningless instruments with a lamp burning brightly above it, a small table across the room with a land telegraph outfit, a large chart on the wall showing the position of all steamers equipped with the wireless for every day of the current month, a few chairs, log books, and form pads; these constitute the furniture.

English Operators

There are two men in the room, one at the desk with the telegraph instruments, the other before the long table with a telephone receiver held at his ear by a contrivance such as telephone girls wear. They look up as we enter, greeting us pleasantly and inquiringly. They are English, as most of the men in this service are. We explain that we want to send a message to the Teutonic. As one of them hands up a form—a "telegraph" form it is merely called—the man at the receiver says "Oh yes, I shall get the Teutonic soon, she is just saying good-bye to the Babylon station now. (This station has since been abandoned.) Must have been delayed; she, should have been along here an hour ago."

After a little he takes the receiver from his ear, "I ought to get her now," he says touching a giant telegraph key about six inches long. Instantly from between two brass balls on the table a stream of sparks leaps forth and the air of the little room is filled with the almost deafening hissing clamor. So many long, so many short T. C. T. C. T. C. the Teutonic call several times repeated, followed by the station's own S. K. Then a pause as he again puts the receiver to his ear. No answer. Either the ship's operator has left his instruments or else there is something wrong. But that isn't likely, as our operator heard Teutonic talking with Babylon not ten minutes ago. Another call and again no response. The man looks at the clock, then says: "He's gone to dinner; we shan't hear anything from him for half an hour.

"Yes, it keeps them quite busy for the first twenty-four hours out," he continues. "Suppose the boat sails in the afternoon as this one did. Well, he was in touch with Sea Gate right from the start until he got Babylon; he's just got time now to get a bite of something before he picks us up; we'll keep him up till eleven or after, and by four o'clock tomorrow morning Slasconset (Nantucket) will be calling him. After that there is Sable Island and Cape Race, to say nothing of passing ships and the daily news reports. No, they don't have but one man except on a few of the biggest ships during the summer." All this while the other man has been occasionally listening at the receiver.

Now he says quietly: "There's something out there, but I can't quite make it out." We stop talking and all is still, but the desultory sighing of the sea, a few frogs croaking in the marsh and the faint barking of a dog back in the country. "Ah," says the man at the receiver, 'It's the Ryndam coming in, forty-five miles southwest of here. I'll ask him if he can raise the Teutonic."

Getting the Teutonic

More sparks, more racket, and a faint brimstone-like odor such as is sometimes noticed after a heavy thunder shower. Silence. "I can hear Ryndam talking to Teutonic now; we'll get T. C. soon." More calls of T.C., T.C., T.C., S.K., S.K., S.K., Then a long quiet pause, as the man at the key reaches for a printed form, writes slowly a few lines upon it, then says: "Teutonic reports seventy miles south west of this station She's going rather far south; may have trouble in talking with her." But there proves to be none. So we sit half deafened by the clamor of the sparks, while from the filmy wires overhead which seem to lose themselves among the stars, the mysterious ether waves are radiating with light's own swiftness, vibrating silently across seventy miles of ocean to where a man, seated quietly by a set of instruments such as we see here, listens to what they tell him and, as his ship reels off her twenty knots an hour through the ocean desert, writes down our thought word for word.

A few other messages having been delivered and received, Teutonic sends her good-bye signal and things are quiet once more. The operator glances at the clock and announces that it is about time for Cape Cod to open up. He refers to the daily news bulletin sent out late in the evening from Cape Cod. There is a similar one sent from one of the powerful stations in Ireland. These are long-distance stations and their tidings are audible for more than half the distance from land to land, so that there is one night in mid-ocean in what is called the "over-lap" where ships receive almost simultaneously the news of the world flashed from two continents three thousand miles apart. But Cape Cod is at it now, and sitting there quietly, receiver to ear, our friend of the machine translates as they come to him the clear, concise sentences that tell, in brief, one day's history of the world.

While we have been listening a fog has drifted in over the sand dunes, the swash of the waves seems far off and muffled, and from the wires above the water drips in a drowsy intermittent tattoo upon the roof. To this accompaniment we hear that a European ministry is "out", that a famous sporting event has been lost and won, that stocks closed dull, but firm, closing prices of the public favorites being given So it goes on for about half an hour, then silence and a long wait in prospect, for the next ship expected, the incoming Deutschland, passed Nantucket at ten o'clock, and will be ready to deliver its numerous messages from incoming tourists to expectant friends about 4 a.m.

Gentlemen of Travel

So we smoke and listen to stories of the service, which are stories of the world, for the wireless is everywhere and wireless men are citizens of the world; tales of travel in Iceland where wood is so scarce that all the firewood has to be taken along, yarns of how tennis courts are made in Labrador, where the landscape consists mostly of rocks and moss, stories of eastern Siberia, of Japan, of Cape Colony. At midnight one of the men turns in, the other refills his pipe and talks on as the spirit moves him, now and then putting the receiver to his ear to hear if the great German flyer has yet anything to say. More yarns occasionally, mostly silence, so the night passes, a fog of tobacco smoke within, a fog of sea mist without, a word or two now and then, the steady drip, drip, drip on the roof; far out to sea an occasional long-drawn wail of a foghorn on some coaster feeling her way along.

But suddenly our companion listens attentively and reaches for his form pad. "Deutschland?" we ask. "Yes," he replies, tearing the silence again with the sharp staccato crashes as he gives the answering call. This time it is our turn to listen for we have no messages to send and many to receive. Most of them are merely "Pleasant trip; will dock at 10.30 a.m.," etc., but some are longer and a few in cipher. Towards the end one comes in telling that a passenger has been taken suddenly ill, that an operation performed at the earliest moment after landing is his only hope. A certain hospital is notified to have everything in readiness and an ambulance at the pier, and his family are notified of his condition. So the sufferer knows that although forty miles at sea and almost twice that distance from the rays of the great electric beacon that marks the entrance of New York harbor, his plight is now known on shore and that all the resources of human wisdom are being marshalled to save his life. But Deutschland signals good-by, our operator replies in kind, lays down the receiver, and, taking up the sheaf of messages, turns to the telegraph key of the land wire.

"Well, that's all till the Savoie this afternoon," he says, as he blows out the lamp; for the fog has lifted and the tide of day is creeping in along the coast. So we say good-by and step out into the wan light, thinking, perhaps of how commonplace the wonderful may seem at close range, and how mysterious even the commonplace may become. We think of the ages of ignorance whose heritage is yet with us, of how young science is in comparison, and the thought comes, 'Where is all this going to end?" So thinking we glance back for a farewell look. The night lies behind us, the east is becoming golden, while before us rises the gaunt white mast with its flimy wire, sentinel like before the coming day.

A True Wonder Book of Brave Exploits Is Reviewed

The Man-eaters of Tsavo, and Other East African Adventures. By Lieutenant-Colonel J. H. Patterson, D. S. O. With numerous illustrations, London: Macmillan & Co., Limited. 1907. Price 7s. 6d. net.

Belfast Whig: — Who has not watched the domestic cat stalking a mouse or a sparrow? With what cunning she silently creeps along, her body almost touching the ground, taking advantage of every bit of cover, until, relentless as fate, the final spring is made, and the warm and quivering flesh eagerly devoured. Most of us have seen this tragedy enacted time after time, and thought little about it. But suppose the cat was a lion, and the sparrow a man, how very differently we should regard the proceedings, more especially if we felt it might be our fate to be the eaten one the next day. Those who would realize the impotence of man in the presence of beasts of prey are strongly advised to obtain Colonel Patterson's thrilling and well-written book, just published. It is as modest an account of deeds of great bravery as it has been our good fortune to read. We can assure the author that, once the book becomes known, the very appreciative "foreword" by that renowned and veteran hunter of big game F. C. Selous will not influence its circulation so much as the real merit of the book itself The simplicity of the story is its charm. Colonel Patterson was appointed one of the engineers for the construction of the Uganda railway, and arrived on the East Coast of Africa (Mombasa) on March 1st, 1898. He was sent to take charge of the construction of the railway at Tsavo, 132 miles from the coast, where he soon found himself in charge of two or three thousand native workmen of various clans and nations. The work of clearing a track, blasting, drilling, and the hundred other operations connected with the making of a railway through an unknown jungle went on merrily, when suddenly

"Our work was interrupted in a rude and startling manner. Two most voracious and insatiable man-eating lions appeared upon the scene, and for over nine months waged an intermittent warfare against the railway and all those connected with it in the vicinity of Tsavo. This culminated in a perfect reign of terror in December, 1898, when they actually succeeded in bringing the railway works to a complete standstill for about three weeks. At first they were not always successful in their efforts to carry off a victim, but as time went on they stopped at nothing, and indeed braved any danger in order to obtain their favorite food. Their methods then became so uncanny, and their man-stalking so well-timed and so certain of success, that the workmen firmly believed that they were not real animals at all, but devils in lions' shape."

The brutes grew so daring that they entered the tents at night when the men were asleep and carried off their victims, as a cat would carry a kitten, before the eyes of the other occupants of the tent. Shots, shouting, firebrands, and thorn hedges were alike held in derision by these monsters. The details of the hideous meals they made are blood-curdling to mere readers; what must it have been to those living in the midst of these horrors, and in daily peril of swift, painful and unavoidable death? Nevertheless, Colonel Patterson never hesitated; he felt himself in charge of these natives, and made up his mind that he would not rest until he had destroyed the destroyers. In the end he accomplished his purpose, but only by the exhibition of almost unexampled bravery, accompanied by marvelous escapes from death. Indeed, the author bore a charmed life. He began by attempting to shoot the lions from perches erected on fragile poles or trees; he ended by boldly attacking, single-handed, two or three lions at once in an open plain without shelter of any kind! A man of this grit was only saved by a miracle. There are many passages of intense interest we would like to reproduce; perhaps this account of the death of the first of the man-eaters is as exciting as one could wish. The lions had killed a donkey, but were disturbed at their meal, and after both lion and author had each had a dramatic escape from death this is what took place—

"I proceeded to view the dead donkey, which I found to have been only slightly devoured at the quarters. It is a curious fact that lions always begin at the tail of their prey and eat upwards towards the head. As their meal had thus been interrupted evidently at the very beginning, I felt pretty sure that one or other of the brutes would return to the carcase at nightfall. Accordingly, as there was no tree of any kind close at hand, I had a staging erected some ten feet away from the body. This machan was about twelve feet high, and was composed of four poles stuck into the ground, and inclined towards each other at the top, where a plank was lashed to serve as a seat. Further, as the nights were still pitch dark, I had the donkey's carcase secured by strong wires to a neighboring stump, so that the lions might not be able to drag it away before I could get a shot at them.

"At sundown, therefore, I took up my position on my airy perch, and much to the disgust of my gunbearer, Mahina, I decided to go alone. I would gladly have taken him with me indeed, but he had a bad cough, and I was afraid lest he should make an involuntary noise or movement which might spoil all. Darkness fell almost immediately, and everything became extraordinarily still. The silence of an African jungle on a dark night needs to be experienced to be realized; it is most impressive, especially when one is absolutely alone and isolated from one's fellow-creatures, as I was then. The solitude and stillness and the purpose of my vigil all had their effect upon me, and from a condition of strained expectancy I gradually fell into a dreamy mood which harmonized well with my surroundings. Suddenly I was startled out of my reverie by the snapping of a twig, and, straining my ears for a further sound, I fancied I could hear the rustling of a large body forcing its way through the bush. "The man-eater," I thought to myself; "surely tonight my luck will change, and I shall bag one of the brutes." Profound silence again succeeded. I sat on my eyrie like a statue, every nerve tense with excitement. Very soon, however, all doubt as to the presence of the lion was dispelled. A deep long-drawn sigh—sure sign of hunger—came up from the bushes, and the rustling commenced again as he cautiously advanced. In a moment or two a sudden stop, followed by an angry growl, told me that my presence had been noticed, and I began to fear that disappointment awaited me once more.

"But no; matters took an unexpected turn. The hunter became the hunted, and, instead of either making off or coming for the bait prepared for him, the lion began stealthily to stalk me. For about two hours he horrified me by slowly creeping round and round my crazy structure, gradually edging his way nearer and nearer. Every moment I expected him to rush it; and the staging had not been constructed with an eye to such a possibility. If one of the rather flimsy poles should break, or if the lion could spring the twelve feet which separated me from the ground, * * * * the thought was scarcely a pleasant one. I began to feel distinctly "creepy" and heartily repented my folly in having placed myself in such a dangerous position. I kept perfectly still, however, hardly daring even to blink my eyes; but the long-continued strain was telling on my nerves, and my feelings may better be imagined than described when about midnight suddenly something came flop and struck me on the back of the head. For a moment I was so terrified that I nearly fell off the plank, as I thought that the lion had sprung on me from behind. Regaining my senses in a second or two, I realised that I had been hit by nothing more formidable than an owl, which had doubtless mistaken me for the branch of a tree—not a very alarming thing to happen in ordinary circumstances, I admit, but coming at the time it did it almost paralysed me. The involuntary start which I could not help giving was immediately answered by a sinister growl from below.

"After this I again kept as still as I could, though absolutely trembling with excitement, and in a short while I heard the lion begin to creep stealthily towards me. I could barely make out his form as he crouched among the whitish undergrowth, but I saw enough for my purpose, and before he could come any nearer I took careful aim and pulled the trigger. The sound of the shot was at once followed by a most terrific roar, and then I could hear him leaping about in all directions. I was no longer able to see him, however, as his first bound had taken him into the thick bush; but, to make assurance doubly sure, I kept blazing away in the direction in which I heard him plunging about. At length came a series of mighty groans, gradually subsiding into deep sighs, and finally ceasing altogether, and I felt convinced that one of the "devils" who had so long harried us would trouble us no more.

"As soon as I ceased firing a tumult of inquiring voices was borne across the dark jungle from the men in camp about a quarter of a mile away. I shouted back that I was safe and sound, and that one of the lions was dead; whereupon such a mighty cheer went up from all the camps as must have astonished the denizens of the jungle for miles around. Shortly I saw scores of lights twinkling through the bushes. Every man in camp turned out, and with tom-toms beating and horns blowing came running to the scene. They surrounded my eyrie, and, to my amazement, prostrated themselves on the ground before me, saluting me with cries of "Mabarak! Mabarak!" which I believe means "blessed one" or "saviour." All the same, I refused to allow any search to be made that night for the body of the lion, in case his companion might be close by; besides, it was possible that he might be still alive and capable of making a last spring. Accordingly we all returned in triumph to the camp, where great rejoicings were kept up for the remainder of the night, the Swahili and other African natives celebrating the occasion by an especially wild and savage dance.

"For my part, I anxiously awaited the dawn, and even before it was thoroughly light I was on my way to the eventful spot, as I could not completely persuade myself that even yet the 'devil' might not have eluded me in some uncanny and mysterious way. Happily, my fears proved groundless, and I was relieved to find that my luck—after playing me so many exasperating tricks—had really turned at last. I had scarcely traced the blood for more than a few paces when, on rounding a bush, I was startled to see a huge lion right in front of me, seemingly alive and crouching for a spring. On looking closer, however, I satisfied myself that he was really and truly stone dead, whereupon my followers crowded round, laughed and danced and shouted with joy like children, and bore me in triumph shoulder-high round the dead body. These thanksgiving ceremonies being over, I examined the body and found that two bullets had taken effect, one close behind the left shoulder, evidently penetrating the heart, and the other in the off hind leg. The prize was indeed one to be proud of; his length from tip of nose to tip of tail was nine feet eight inches, he stood three feet nine inches high, and it took eight men to carry him back to camp. The only blemish was that the skin was much scored by the boma thorns through which he had so often forced his way in carrying off his victims.

"The news of the death of one of the notorious man-eaters soon spread far and wide over the country; telegrams of congratulation came pouring in, and scores of people flocked from up and down the railway to see the skin for themselves."

The account of the killing of the second man-eater is equally exciting and full of "live" touches that bring the whole scene vividly before us. Without the slightest attempt at "fine" writing, Colonel Patterson tells his story with a simplicity and modesty that is really charming, and every page of his book teems with interest and valuable information. These two lions possess the unique distinction of having been specifically referred to in the House of Lords by the then prime minister, Lord Salisbury.

"Well had the two man-eaters earned all this fame; they had devoured between them no less than twenty-eight Indian coolies, in addition to scores of unfortunate African natives of whom no official record was kept."

When a serious mutiny broke out among the native workmen Colonel Patterson showed the same daring, coolness and tact he had exhibited in the case of the lions. Although warned, he would never leave a certain quarry alive; he went to it quite unarmed, and only narrowly escaped death at the hands of the excited mob. This chapter makes as exciting reading as any of the incidents in the book, numerous as these are. Adventures with more lions, hippos, and rhinos, are told in the same simple yet soul-stirring style. Wonderful as these are, they all bear the stamp of truth, and indeed Colonel Patterson explains that he has toned down the incidents instead of exaggerating them. The last chapter contains an account of how the author found a new race of eland which has been named after him, Taurotragus oryx pattersonianus) on the great Laikipia Plateau. Colonel Patterson's father-in-law—our esteemed townsman, Mr. William Gray, M.R.I.A.—exhibited a slide of this eland at the conversazione of the Belfast Naturalists' Field Club last year—the first time the new eland had been shown at any scientific meeting. A useful appendix gives much information to sportsmen intending to visit East Africa, and the whole book is copiously illustrated with excellent photographs, most of them by the author. We can with the utmost heartiness recommend this fascinating and thrilling volume to both young and old boys. It grips one from the first page to the last.

Colonel R. E. Crompton, C. B., R. E., on Scientific Road Building

Colonel R. E. Crompton, C. B., R. E., contributes the following article to the London Times:

The future development of our roads, both in town and country, is a question which interests everyone. During the period following the introduction of railways, which displaced the coach, the post chaise, the road wagon, and the canal boat, the long lines of road connecting our large towns, most of them parallel to the railways, became practically deserted. Their upkeep was small and the expenditure on the highways of a district was concentrated on the roads feeding the railways, the length of which, however, was quite small in proportion to the total mileage of the country.

With the introduction and extended use of new road vehicles the traction engine, the bicycle, and, finally, the motor car and motor wagon of the present day, a great traffic has again developed itself on these ancient lines of communication.

In the old coaching days many of these through roads were maintained as turnpikes, so that the unfairness of throwing on the shoulders of the country ratepayer the burden of maintaining lines of communication between great towns was little felt. Now, however, the whole expense of maintaining these roads has to be borne by the county and rural district boards, so that there is urgent need for legislative reform.

No one doubts that much of the animosity shown to the modern motor car, at all events in the rural districts of England, is due to the fact that not only have the rural populations to submit to the inconvenience caused by their quiet, little used roads being converted into busy lines of thoroughfare, but also and largely to the fact that they have to pay for maintaining the roads to carry this traffic. But, apart from the question of transferring the cost of the upkeep of roads to the shoulders of those who benefit most by their use, the demand for improved roads has already been met by considerable advances in the science of road construction.

No one who uses the roads, whether he be a motorist, cyclist, or one who drives horses, can fail to have noticed the great increase in the mileage of roads treated in a manner to improve their surface and to render them dustless.

The main principles of road construction still continue to be those laid down by McAdam. A suitable foundation the depth and strength of which varies with the nature of the subsoil, is covered with a layer of hard stone broken into angularly shaped pieces, and these are either consolidated into a smooth surface by the passage of the traffic itself, or are rolled down by steam rollers.

In the days of McAdam the work of making or repairing a road was usually carried out so that this consolidation could take place during the wetter seasons of the year, but, owing to the almost universal use of steam rollers, roads are now made and repaired at all seasons. At the time that the roller is passed over the coating of metal the process of consolidation is helped by putting on a coat of sand, gravel, or similar material, technically called "binding" or "hogging," and the whole is drenched with water and consolidated by the roller whilst still wet.

A road thus constructed depends on being held together by the small particles derived from the "hogging," and these are practically cemented into place by dried mud; but in our climate this use of water as the ultimate binding material is the cause of all our woes. In wet weather the finer particles of the binding material wash out, and in dry weather after the water has dried out this finer material is blown away as dust. In both cases the result is the same. The larger particles of road metal are no longer held together firmly in position, and they become loosened under the traffic; and under the rolling action of wheels the wear of the metal is rapid and continuous. Some years ago it became evident to road surveyors that something more efficient than water must be used as the binding material. The success of asphalt and certain tarred footpaths pointed to the use of tar. Mr. Hooley, the county surveyor of Nottinghamshire, first carried out the practical experiment of saturating with tar from the gas-works the road metal, formed of blast-furnace slag. This tar-saturated material was rolled down in the usual way and was found to offer great advantages, as with such a road less mud was formed in winter and less dust in summer.

Many minds worked in the same direction, but for a long time the experiments were isolated. Local road surveyors persuaded their boards to allow them to make short lengths of this improved road surface. The results obtained were various. In some cases the tar remained soft, adhering to the wheels of the vehicles, and the evils of its use seemed almost sufficient to counterbalance what was gained. The expriments, being on a small scale, were costly, but thanks to the public outcry caused by the dust-raising of modern motor traffic it became imperative that the results of these isolated experiments in various parts of the country should be collated and that the whole question of road construction should be considered by some central authority.

The motoring and cycling world already possessed an organization called the Roads Improvement association, which had originally been formed in the interest of cyclists to induce local authorities to put in order certain lengths of bad road. The road authorities believe that the owners of heavy motor vehicles are largely responsible for the increasing cost of road maintenance. The owners of these vehicles, on the other hand, hold, and with reason, that the wear of the roads might be reduced by improvement in the methods of construction and repair. In view of these contentions a committee of the Roads Improvement association has been endeavoring for some time past to bring the authorities who maintain the roads into friendly co-operation with representative users of road vehicles, especially of the heavy motors which have lately come into extended use.

This good work has received a notable impulse during the past year. Under the auspices of the Roads Improvement Association meetings between the road-makers and the road-users have been held. Competitions directed to show the best machinery for treating the roads with tar and the best preparations of tar to be used for the purpose have taken place, valuable prizes have been competed for and awarded, and the public are beginning to see the results in the long lengths of tar-treated roads that we find in the home counties. The recent developments of using tar in road construction have been along two distinct lines. First, that of saturating the surface of existing roads with suitable tar compounds by tar-spraying machinery. The experience obtained in treating a great mileage of roads in Kent, Middlesex, Surrey and other home counties has shown that the cost of obtaining a very satisfactory surface which will last for one summer season is not in excess of the annual cost of watering the same length of road; and in addition to which it is probable that the wear of the road for the same period has been reduced, so that some saving will be effected in maintenance.

The second and more complete method of treatment is that the road, when repaired, should be made up throughout the whole depth of its metalling with road metal saturated with tar. Considerable lengths of the Thames Embankment have been remade in this manner, and every one can judge for themselves that the result, on the whole, has been highly satisfactory. For the first time since the Embankment was completed as a thoroughfare has the road been maintained for any length of time in a reasonably smooth and satisfactory condition.

The latest development of this road treatment, which seems to yield financially very satisfactory results, has been introduced by Mr. Gladwell, the engineer and surveyor to the Eton and Slough Rural District Council, who last year tried the experiment of laying a cushion of fine tar topping, similar to that which had previously been used upon footpaths, upon the foundation of a road from which the upper layer of road metal had been removed ready for the usual repairing process. Mr. Gladwell then laid the new metal on the surface of this topping and rolled it down into it, so that the fine tar topping or "matrix," as it should be called, gradually came up to the surface.

Since that time Mr. Gladwell and Mr. Manning, the surveyor to the Staines Rural Council, have further developed this process, and roads have been completed for that council which seem to be exceedingly perfect; and the cost has been only 2 1-2d. per superficial yard greater than the cost would have been if the repairs had been carried out in the usual manner by laying on and rolling down a coating of granite.

The actual figures reported by Mr. Manning to his local council were that whereas the ordinary repair would cost 1s. 6 1-2d. per square yard, the improved tar-treated coating just described cost 1s. 9d. per yard.

If Messrs. Gladwell and Manning's results should be confirmed by surveyors in other parts of the country, we shall be in face of the important fact that financial considerations need no longer prevent the adoption of tar compounds as binding material for our roads. This would render the roads more durable, and free them practically from dust in summer and mud in winter. It would, moreover, materially reduce rolling resistance and road vibration, thereby diminishing the noise of traffic and the cost of haulage.

Frenchmen Who Rose to Eminence

Some time since I picked up in Paris a curious little book by Alphonse Karr, called "Historiae des Paysans illustres; Plutarque des Campagnes," 1828. Among the number of peasants' or workmen's sons attaining fame or local celebrity figure Flechier, perhaps best known to English readers by his "Grand jours d'Auvergne"; Ney, "le brave des braves"; Amyot, the translator of Plutarch; Hoche, the pacificator of La Vendee; Ramus, mathematician and philosopher, a victim of St. Bartholomew; Palissy, the great potter, who narrowly escaped a similar fate; the savant Mazillon; Marmontel, the author of "Belisaire," and friend of Voltaire; Chaptal, the great chemist and discoverer, who was summoned by the convention to supply the army with gun-powder, and did so; Laplace, the illustrious physicist—these inter alos, and, if not peasants' sons, all of them were of humble origin. And if Alphonse Karr's interesting theme were brought up to date, his successor would be able to add the greatest name in French fiction—Balzac!

"My name is on my certificate of birth as that of the Duke of Fitzjames is on his," somewhat pompously wrote the author of the "Comedie Humaine," and, unlike Rouget de Lisle, he had not knowingly appropriated the much coveted particle In all probability he firmly believed that he had come of noble stock But in his work "Honore de Balzac" M. E. Bire relates that a well known antiquary entirely disproves poor Balzac's title to the "de." This gentleman, M. Charles Portal, has, indeed, unearthed the birth register of Balzac's father, who was born in 1746 in a village of Languedoc, and in that document is described as Bernard Francois Balssa, son of a laborer. The great Honore's father had literary tastes, and even wielded the pen. Quite possibly he may have thus euphemized his patronymic out of respect for that early master of French prose (1507-1654) really belonging to the noble de Balzac or de Balsac house. Be that as it may, M. Bire truly says that Balzac has earned his right to nobility.—Westminster Gazette.

Cases have been known of men who have permitted business to interfere with golf, but they are rare, and certainly it would be extremely difficult to find an individual bold enough to incur the odium of his fellow-golfers by admitting the impeachment.—Golf Illustrated.