PROGRESS

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Progress

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EDITORIAL COMMENT.

Physical Protection of Youth.

A sound mind in a sound body ought to be the primary object of the school system of every country. Of the mind it may be said that its health depends entirely on the health of the body. It may be freely admitted, at the same time, that this is acknowledged by the Education Department, which bases its system on the fact. There is, however, a condition precedent to be attended to. It is that before the body can be kept well, it must first be well. The Teachers' Institute has long since appreciated the point, and there have been here and there examinations not of the general order, but particular, such as those for dentistry purposes. Here is the germ of an excellent system. Why not have all the schools of the Dominion visited once a day by the various members of the medical profession in their neighbourhood? It would not be a detailed examination such as the miners objected to the other day so strenuously. The children would just pass in file before the examiners, and these would simply mark those who seemed to them off colour in any way. At the close of the examination these suspects would be questioned; and if the examiner came to the conclusion that there was disease or trouble of any kind, he would state the case and the school authority would notify the parents. The suspect could then be, if necessary, laid up for treatment either by the family doctor, or the examiner, or any one else the parents might fancy. The great thing would be that every ailment would be taken in time, and the probability is that most of the mischiefs of childhood would be obviated. Another advantage of the daily expert visit would be that all the points of sanitation would come under review of competent authority every day—cubic air contents of rooms, ventilation arrangements, drainage, water supply, all these important things would be systematically regulated, and nothing going amiss would be missed. Under such a system the well-being of the school children would be materially increased, and, therefore, the sane mind in the sane body would be a more perfect reality than it is now. The work would be honorary, of course. It would we feel sure, be a labour of love to medical men fond of their profession and taking a pride in it. In fact, the profession which supplies the hospitals with honorary physicians and surgeons has demonstrated its readiness to supply the schools with honorary inspectors. Lastly, the concentration in the schools would give the best opportunity for inspection, and the work would be done disinterestedly and impartially, as well as ably.

Industries and Commerce.

The Minister who holds the portfolio of Industries and Commerce is also the Minister of Tourist and Health Resorts. There is, of course, nothing special to connect these two departments one with the other, except it might be the fact that the two offices were created about the same time. But that is more coincidence than reason. We note that the Minister holding these two portfolios is very busy with the business of the Tourist Department, planning tracks and devising excursions which seem destined to develop into alarms in the Treasury. Which is all well, no doubt, from the Tourist point of view. If it is, this will not be the only occasion on which the Tourist side of the portfolio has received applause. But the other department has not yet been quite so fortunate. What can be done? In one respect we can see the opening for a good new thing. At present the Dominion is unable to get a thorough survey of its industries until the quinquennial census comes round, the compiling work being part of the general statistical work of the Dominion in the hands of the Registrar General. Why cannot the Industries and Commerce Department attend to this matter? The Labour Department attends to the factories, giving the public valuable information every year, it is true. But the subject is quite beyond the scope of a Labour Department, the duties of which are to compile the statistics of labour, not of production, or exchange, or export, or distribution within the Dominion. We have a Department of Industries, and we have a right to expect from that department the fullest classified information about everything that happens during the year to the industries of the country. The annual returns of this department ought to be as full as are the quinquennial returns of the Registrar-general.

Phormiun Tenax.

The head of the flax-grading department has just issued a report which ought to make all interested in this industry weep bitter tears. The tremendous output of Manila of last year is going to be repeated this; there is no hope for the Dominion's phormium unless the millers either reduce the cost of production or improve the quality of the fibre. This was said forty years ago by all the experts and all the Commissions, expensive and otherwise, if there were any that could be classed as otherwise. Since then thousands of tons have been exported and millions of pounds sterling have passed through the flax industry. There comes a check, the old enemy appears on the scene, and lo! it is discovered that we have nothing but the old weapons to cope with him. Now the improvements in the methods of the old enemy being the results of the peace which comes of a strong administration, these methods are come to stay. Therefore the choice between improving quality, or reducing price, or bursting, is looking permanent. The industry is preparing a deputation for the Minister, to get him to do something. We advise them to ask for a Royal Commission, whose order of reference will bar the past, of which we have records enough, and to spare, confining itself to the future; a future big with rewards for invention of efficient methods of dealing with what ought to be the most profitable product of the Dominion's soil. PROGRESS has for years advocated this course, and feels elated naturally at the approach of some attempt to get away from the bad old traditions which have done so much to throttle the industry.

Electricity

Electron History.

(By Sir Oliver Lodge, in the *Journal of the Society of Chemical Industry.*)

The first inkling of the discovery of the atomic nature of electricity dates back to Faraday and his experiments in electrolysis. The indivisible atomic charge—the charge of a monadion—was then practically measured, at least as soon as the size of the atom was known; and an "atom of electricity" was spoken of, both by Maxwell and by Helmholtz. In amount, measurement indicates that it consists of 3.4×10^{-10} electrostatic unit, some uncertainty affecting the second significant figure. On this basis, Dr. Johnstone Stoney gave to these unit charges their name "electron," and speculated ingeniously on some of their properties. Then J. J Thomson found that in the rarefied air of a vacuum tube these charges were loose, flying as cathode rays; and identically the same, no matter what was the kind of residual matter in the tube. It was in this state that their mass was measured, and found to be a thousand times less than the previous material minimum—the hydrogen atom. Then Zeeman found that their orbital motion was the source of all bright line spectra—that is to say, that they emitted radiation, carving the ether into waves.

The condition of electricity is due to the procession of electrons and positive charges; and the good conducting power of metals, whether for heat or for electricity, is supposed to be due to a crowd of electrons freely permeating the interstices between the atoms, being handed on from one to another so readily that they are practically dissociated or free in vast numbers. And the long-known connection between heat conductivity and electric conductivity is found to be thus rationally and quantitatively accounted for.

Furthermore, the regular gradation of electric properties exhibited by the elements in Mendeleef's classification can be stated electrically, in a way that certainly suggests an approximation to the truth. Each octave has an electro-positive and an electro-negative end, the most extreme members being at the ends, and an almost neutral body in the middle, of each series; and in the step from the extreme electro-positive of one octave to the extreme electro-negative in the next, an intermediate halting place of a neutral and quite inert body is now known, by the discovery of the argon-krypton-xenon series.

The atoms of the electro-negative set are those which can easily make room for, and have acquired, extra electrons—more than properly belong to their constitution; these are the non-metals, and are chemically active on that account. The atoms of the electro-positive variety are those which easily lose, and have lost, some of their electrons—thereby becoming good conductors by reason of the loose electrons which they have let go; these are the metals. A strong electric attraction naturally exists between members of the electro-negative and the electro-positive group, because they are oppositely charged; and the clinging together of these atoms, under electric attraction, constitutes chemical combination. Conducting power usually disappears after combination, except the variety of it, which may be brought about by the dissociation or breaking up of the compound molecules.

The epithets positive and negative, which from the electrical point of view seem so interchanged and inconvenient, from the material point of view get right again. For the atom which is hungry for more electrons and has absorbed them is electro-negative; while the atom which has a surplus and has extruded some is electro-positive. A tetrad can be either the one or the other. In methane the carbon is presumably acting as a negatively charged body. In carbon tetrachloride the carbon is presumably acting as a positive. Chlorine seems to have much more residual affinity than hydrogen has, and accordingly the molecules tend to cling together, and the substance is a liquid instead of a gas.

Once more I repeat that the term in Van der Waal's famous formula $\frac{a}{v^2}$ or Laplace's K, is the liquefying force, and is a measure of this outstanding affinity; it is determined by the latent heat of evaporation, or to some extent by the boiling point and the critical point.

Bleek-Love Electric Battery.

Since the original description appeared in these columns of the remarkable invention patented by Messrs Bleek and Love, of Brisbane, a paper on the subject was read before the Australasian Association for the Advancement of Science at its meeting in the North Australian city. The new thing in that paper was the statement that a third test had been made—in addition to those of Professor Lyle and Mr. Badger—by a new method, naming the ingredients, not known at the time of the former tests. This third test was conducted by a capable electrician, Mr. B. O'Connel, and showed a larger output than the very satisfactory ones previously disclosed. The inventor thus concluded his paper:—To the unskilled in electrical knowledge, the importance of a discovery of this nature would hardly appeal, but when the writer assures that person of the benefits that will accrue ultimately from the cheap and instant production of a powerful and constant electric current, its importance will become manifest. Electric lighting for private houses, vehicles, boats, or for decorative purposes will be instantly available to any unskilled person who is capable of filling an ordinary kerosene lamp; surgical operating, and exploring lamps, surgical cauteries, and similar instruments, will be effectively and cheaply provided with current. X ray induction coils, and cinematograph machines can be operated in the distant country towns, when there is no dynamo current available. The domestic sewing machine, fan motors, dental engines, and all kinds of small motors can be effectively worked with an installation of four cells. One small cell will provide a reading lamp or bed light, which is absolutely safe and without danger from fire, for a period of about 60 to 70 consecutive hours, at a cost of a few pence. In conclusion, it must be understood that no electric current chemically produced can compete with that produced by the dynamo, especially where coal is so cheap as in Australia, but in the thousands of country towns and villages throughout the world, where there is no power depot, the discovery made by the writer should prove a real boon to mankind.

Edison and the British Labour Market.

A correspondent of the *Times*, having visited the great inventor at his laboratory in New Jersey, reports him as having said: "Here I've had to close down my phonograph factory in England—what's the name of the place? I've forgotten; somewhere near London. All the others in Europe paying, we couldn't make that one pay. We get good work out of the French and the Belgians and the Germans and Austrians, but the English—no good. Belgians 85 per cent., English 30 per cent." Mr. Edison meant ratio of productive capacity. He went on: "Mind, I'm not speaking of the English mechanic. He's all right; none better in the world. I'm talking of the common labourer—man you pick up on the streets. What is it? Too much booze? Or general deterioration? Or what?" Now, the man who is primarily wanted in a phonograph factory is the skilled mechanic, who makes the machines, not the common labourer who humps the cases. Yet Mr. Edison is reported to have praised the skilled mechanic to the skies—"all right; none better in the world," and denounced the other as a boozer and a degenerate. Out of this dilemma there are only two ways. Either the correspondent failed to understand the usually plain English of the great inventor, or he "faked the par" without ever going near him.

A new process for making an insulator, according to the "Electrical Review," has appeared on the Continent. It resembles ebonite and consists of a mixture of tan bark with one-third of sulphur The whole is heated until the sulphur melts. The mixture is well stirred and then cooled ,when it takes the form of small black grains. These are put in a pressure mould and heated, the result being a block of insulating material of any form.

For more than a year past Dr. S. Leduc, of the Medical School of Nantes, has been engaged upon experiments connected with the possibilties of the use of electricity for the slaughtering of animals for food consumption, and with good results.

The term electriculture has been applied to the use of electricity as an aid in the cultivation of plants and vegetation, and it would appear, from the reports circulated at intervals from various sources, that in this there is offered an attractive field for research with every promise of distinct beneficial results being achieved.

Astronomy

Is there Life on Mars?

Is there life on the planet Mars? Some prominent writers actually write much of the "Martians," and with the firmness of touch always used in dealing with living people. Neither are they alone. On the contrary, they are supported by the recent conclusions of a man of science. Professor Lowell, of Flagstaff, Arizona, in his now famous book of last year, made no secret of his belief in life on Mars. He went so far as to introduce the world to an elaborate and gigantic system of canals, constructed by a race of considerable engineering skill, by which much space was rescued from the vest deserts constituting the bulk of the planet.

This conclusion, emphatic and positive as it was, has been since challenged by Professor Stoller, of Union College, Shenectady, New York, in spite of the fact that it has received the respectful consideration of many men of science. He takes his stand on the difference in physical conditions between the earth and Mars.

The facts agreed upon by astronomical authority are that, the diameter of Mars (4200 miles) is about half that of the earth; that its volume is equal to one-seventh part of the earth's; and that the force of gravity is but three-eighths of what it is with us. This low gravity implies a rare atmosphere, estimated by Pickering, of Harvard, at one-tenth of the density of the earth's, and of its composition little is known, except that it contains aqueous vapour in small quantities, as clouds are seldom seen by observers.

The mean distance of Mars from the sun is 135,000,000 miles, or 45,000,000 miles more than ours. The heat received from the sun's rays in Mars is as one to two, and the mean temperature, even of the temperate and tropical regions, is not much above 32 degrees. The tenuity of the atmosphere both renders the temperature lower, and makes the fluctuations very great between day and night; as the mitigation by day would be small and the radiation by night very great. This effect is aggravated by the greater length of the Martian year (687 days), though the Martian day (24 hours 38 minutes) is practically the same as ours. In Mars there are neither mountains nor seas.

Now, as to the life inhabiting this planet. The theory of Professor Stoller is very simple and direct. First, as to the origin. "Protoplasm" with many is the accepted first form—the "physical basis of life" of Huxley. This has so completely baffled science in the matter of the conditions of its production on this planet that it must necessarily be put aside as a thing not to be handled as to its possibilities in any other. The consideration is therefore confined to the nature of the beings that can exist under the conditions of the planet as known to us, through the observations and researches of the astronomers. Firstly, as there are no oceans, and as all the water on the planet is probably due to the annual melting of the polar ice-caps, there can be but little marine life. Moreover, as there are no zones divided from one another by seas or mountains, the fauna of Mars must present much less variety of types than are to be found on the earth. If, then, there is life on Mars, there can not be that wealth and variety of it with which we of the earth are familiar.

Secondly, these creatures must be able to withstand extreme diurnal changes of temperature; their muscular system to meet the lower gravity of Mars would need to be only three-eighths of the strength required on the earth, and last, but by no means least, they would have to be able to live in a very rare atmosphere. To do this they must have ten times the lung capacity, and they must be able to do with a very meagre supply of oxygen.

This is the fatal objection to the theory of life on Mars, at all events in the higher organisms, for even if the whole Martian atmosphere consisted of oxygen, there would be then only half as much per cubic foot as in the earth's atmosphere. "But," says the Professor, "this supposition is impossible, as an air composed wholly of oxygen would have the effect of immediately burning up the animals that tried to breathe it."

If, in order to increase the buoyancy of this atmosphere for the sake of the birds, if there be birds, as the Martian atmosphere is too thin to support flight, we give weight by adding in our imagination carbonic acid to the atmosphere, we only further complicate the problem of respiration, which already appears so impossible. In fact, it is difficult to imagine why the Professor raises the question of flight at all, for if the birds cannot breathe, it is not worth while considering whether they can fly.

But he is a most careful and painstaking Professor, and he goes still further, and considers the question of the ancestral history of the possible Martian animals. The ancestral history of man carries us back about one-thirtieth of the whole of the geological period of the earth, as estimated by the two methods of erosion plus sedimentary accumulation, and the conduct of fused rocks in cooling, at 24 to 30 million years. With us there was a mollusc age, a fish age, and a reptile age, before the first mammals, and of these there were many orders before man appeared.

May there not be some of the lower orders of life in Mars now? But as the conditions do not appear to be favourable to the higher orders which can not breathe, and there is no evidence to show that these conditions are changing, it seems bootless to take the matter further. The definite conclusion so far as we can follow Professor Stoller, is that the atmosphere of Mars is against the hope of finding any of the higher types of life there. It would be possible to live on Mars with a flabby muscular system. Life might be very pleasant there to creatures with an attenuated, elongated bone structure. Some thickening of the drums of the ears might make it endurable, in spite of the wrangling power of a people with ten times the lung capacity of a Billingsgate fishwife; and it is easy to imagine some arrangement of the skin by which the great diurnal changes of temperature might be deprived of even the unpleasant part of their effect. But the difficulty of the breathing appears insurmountable. It forces us to believe that if there are beings of as high an order as man in Mars, the conditions of life must be radically different. But that would be begging the question. It is another way of saying that in an atmosphere in which breathing is impossible we cannot conceive the possibility of life as we know it on earth.

The Calendar of Venus.

At the April meeting of the British Astronomical Association, Captain Grant read a very interesting paper on a subject which belongs to philosophy quite as much as to astronomy—the development of the idea of time and the evolution of the calendar from the most ancient epochs to the present day.

Although the foundamental division of time, the day, appears to us intuitive, we must remember that in the arctic regions the marking of this division is by no means easy. During several successive months the sun is either always below or always above the horizon and the only method—a very uncertain one—of distinguishing between day and night is to observe the times of high and low tide. We owe the months to the motions of the moon. To this day the Malays, Polynesian, and Australian aborigines reckon time exclusively by months and days.

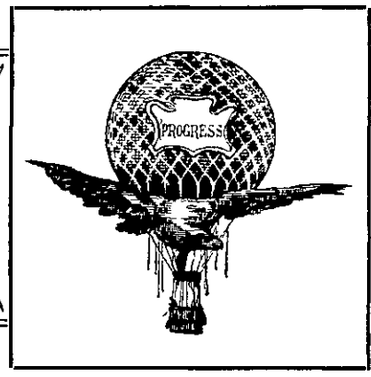
The greater unit of time, the year, characterised by the regular succession of the seasons, has presented the greatest difficulties to exact determination, partly because the seasons are not sharply distinguished in some regions, partly because of the universal desire to establish among the year, month and day simple relations which find no support in the facts of astronomy.

Mr. M. Maunder, in commenting on Captain Grant's paper, remarked that the inhabitants of Venus, if there are any such, must find it extremely difficult to establish units of time. If Schiaparelli's theory is correct, and Venus always turns the same face toward the sun, the planet has no day, and the lack of a moon deprives it of a month. Finally, it has no year, for its axis of rotation is perpendicular to the plane of its orbit and the latter is almost circular.

The problem of the rotation of Venus is yet unsolved. Stefanik and Hansky include from their recent observations, made from the summit of Mount Blanc, that the planet rotates on its axis once in about 24 hours. This is the opinion that was generally held before the researches of Schiaparelli. Lowell, on the other hand, has brought forward fresh proof that Venus always presents the same face to the sun.

Fall of a Meteorite.

The mystery surrounding the explosion seven miles from Hawera, which was lately heard in Wanganui and for many miles north and south along this coast on Thursday, Jan. 28 has now been fully explained, the nett result being an acquisition to the Wanganui Museum, through the prompt and energetic services of the curator, Mr. Marriner, of portions of a meteorite. Near Hawera there was heard a crackling noise overhead, like a volley from rifles. The next development was the sound of a piece of material falling over on to Mr. C. J. Hawkin's estate, into a pine plantation, about half a mile east of the station. Another piece, as far as could be observed, fell amongst some dense bush on a steep bank above the creek, about 440 yards below the bridge. A third piece was heard falling shortly afterwards, like a piece of rocket, the explosion, which must have occurred at a great height, having distributed the pieces. The third portion fell into the creek with a splashing, hissing sound, like that produced by the immersion in water of hot iron.



The Mastery of the Air

A Record of the Achievements of Science in the Realm of Aerial Navigation

International Law of the Air.

The determination of the French Government to call a congress of representatives tc discuss the aerial situation, shows a general recognition of the fact that the flying machines have come to stay, and that staying is another word for developments of many kinds in many directions. "What are we going to do, when everybody is flying?" That is the question now disturbing statesmen and municipal rulers.

The law of the soil is that the enjoyment thereof to the owner continues without limit—within his boundaries—far into the earth below him, and high into the air above him. The first is limited as to precious metals, the second is boundless as the "blue dome of air." But now the jibe of the French philosopher, used in another connection, sets the wits wondering. Said he: "La propriete c'est le vol." Now "vol" means flight as well as theft. What, then, becomes of property when men take to flying? A nation is averse to permitting inspection of its fortifications from above, but if the air above ceases to be its property, having become the property of every one, spy or otherwise, who flies, how are the secrets of the forts to be kept? In like manner, the profit of the Custom houses may be infringed, and what remedy have you? True, you may compel all flying machines bound for foreign parts to carry papers and have them cleared, and you may catch the smugglers who evade the law of clearance, for the flying smugglers must land to do business. But the spy who takes photos of your defences from above, and does not intend to land on your territory, how are you to keep him off? Obviously by fixing a limit of altitude below which he may descend only under pain of being fired upon.

Two things are then clear enough in the programme of this conference of the flying Powers. The representatives may agree on the "clearance" of airships, and on the altitude of all flight above certain spots. These things will be difficult, and the securing of them will involve much that is undesirable and debateable, but they are not impossible.

What is impossible is to secure the inviolability of mutual aerial territory. A belligerent may practise the new reading of "La propriete c'est le vol" in the night or under cover of a mist, and thus run no risk, as he does who leaves tracks on the soil; who is, moreover, compelled to keep to the roads, and unable to force or overleap barriers. Violation of neutral territory will continue to be a breach of international law, but there will often be no evidence of the fact This will lead to interesting debates.

From the Municipal and police point of view there will be much to regulate, and there must be for the air an International Rule of the Road just as there is for the water. Already there is much complaint of damage to gardens from thrown-out ballast or unconsidered trifles dropped overboard from passing balloons; of chimney pots broken by contacts; of mischief done to roofs, towers, plantations and crops by dragging anchors; of the startling effects of falling aeroplanes.

On the other hand, the spread of flying must solve the great problem of locomotion which is proving daily so terrible for all great congested cities. Instead of the battle of the "overheads" and the tunnels, in place of traffic crawling at snail's pace under the control of uplifted hands and martial figures, there will be ease and comfort below, procured by the transference of a large proportion of the traffic to the limitless atmosphere. The danger of damage from this traffic to property below will be large. But the danger to life and limb will be lessened in proportion to the proportion of life and limb carried through the air.

Of course, in the limitless atmosphere there must be a Rule of the Road, otherwise the limitless atmosphere would be a limitless death trap, with flying machines travelling at the already predicted rates of speed which have gone over 100 miles an hour, with confident talk of double. What side to meet on; what side to overtake on; what principle for governing the plane of two machines, one of which must rise while the other descends, if they are to avoid collision; what lights to carry by night; what signals for fogs; what to do in fact in foggy weather. All these points offer a maze for settlement on lines of international agreement. And it is obvious that there must be distinguishing marks for identification.

It is apparent, in fact, that the accompaniments of the new art are going to be important and far reaching. That they will want much thought and disinterested discussion goes without saying. For the present, the fact that this thought and discussion are being arranged for, is a strong proof of the sound progress of aviation.

Farman's New Departure.

According to his own account of his sensations, Farman's trip of seventeen miles in twenty minutes must have had enough sensation for the most exacting. Everything was new and debatable, while the pace gave little time for deliberation. Suddenly some tall poplars loomed up before the rapid flyer. Right or left or over the 90 feet of shimmering leaves! As the question formed itself in his mind there was a great cawing and scattering of rooks from these very treetops, scared by the approach of this gigantic artificial bird. Just a touch of the lever, and the poplars were left far below, and the sensation of uncomfortable doubt was succeeded by more than a suspicion of automatic security. The event showed how easy the control of the flight, but until the event what fearful uncertainty of rushing headlong flight!

Just as this change came, a great windmill approached with what seemed an unexpected dash out of the frontal vagueness. The windmill was supported by a large village, and a railway-line adjacent furnished a heavy rushing train ready for the broken aeroplane and its rider. Escape seemed impossible, but less so than with the poplars. "Bah! One can only die once." It was the confidence of stage daredevilry rather than of real life, and before the words were out, mill, village and train were far below and astern.

These are the joys of the pioneers of the air. Listen to the pioneer on the subject: "During my flight I tasted the greatest joys of my life. There was the charm of flying above my fellows, while the peasants ran about in groups below. From all sides people, looking very small, gathered together to watch. I saw smoking, vomiting trains on their rail metals, and the motor-cars travelling under clouds of dust. And I was in the pure air, kissed by gentle breezes, where the sunshine illuminated my undisturbed way."

Progress of Aeroplaning.

The more the progress of the aeroplane is studied the more marvellous does it seem, and the more certain does it appear that the ultimate development will be something far greater than at present is suspected by mankind. Here is the latest compiled table:

Date	Name	Place	Mile	Yd.	M	S
1905						
Sept 28	Wright Bros	Dayton	11	125	18	8
Sept 29	Wright Bros	Dayton	12		19	35
Oct 3	Wright Bros	Dayton	15	25	26	5
Oct 4	Wright Bros	Dayton	20	75	33	17
Oct 5	Wright Bros	Dayton	24	20	30	13
1906						
Nov 11	M Santos Dumont	Paris		230	21	18
1907						
Oct 8	Herr Wels	Trautenau	350ft.			
Nov 7	H Farman	Paris	1300			
1908						
Mar 22	H Farman	Paris	2	1540		
May 14	Wright Bros	Manteo	6		9	0
June 23	M Delagrange	Milan	10	1105	18	30
July 6	H Farman	Paris	11		20	10
Sept 5	M Delagrange	Issy	15½		30	0
Sept 5	W Wright	Le Mans	16½		15	50
Sept 9	O Wright	Fort Meyer	51¼		56	0
Sept 9	O Wright	Fort Meyer	37½		62	13
Sept 10	O Wright	Fort Meyer			65	42
Sept 11	O Wright	Fort Meyer			70	30
Sept 12	O Wright	Fort Meyer	45		74	20
Sept 21	W Wright	Le Mans	56		91	25
Sept 30	H Farman	Mourmelons-le-Grand	24		35	0
Oct 6	W Wright	Le Mans	42 (with passenger)		64	29
Dec 16	W Wright	Le Mans	Record of Height of 250 feet			

To the above has to be added the information that another flight of Wilbur Wright (later than Dec. 16) covered ninety-five miles in the fast time of 114 minutes. This is the highest record attained up to the date, as well as the longest, for the machine

soared up to 400 feet. The direct pecuniary result was the winning of the £40 prize offered by the Sarthe Aero Club for the highest flight.

The official distance was only sixty-two miles, that being the shortest distance between points. But the machine flew far outside the track, the officials of the club estimating the distance as 95 miles as aforesaid. The long round is a disadvantage, perhaps, showing the need for a very wide turning space for the Wright aeroplanes. But the fact remains that the distance has been covered of 95 miles. During the trial there was a wind of twenty-one miles an hour. The speed was throughout swift and the going regular.

As he completed the forty-fifth round Mr. Wright's petrol feed tap closed accidentally, and he decided to come down. On landing he told an interviewer, "But for this little accident I should not have come down, for I had set out to remain three hours in the air, and to cover 120 miles."

After lunch Mr. Wright carefully overhauled his machine, and at 3.48 p.m. rose again to compete for the Sarthe Club height prize. The wind had increased in violence since the morning, and as Mr. Wright shot

CARICATURE OF MR W WRIGHT

up into the air it was blowing with almost hurricane force, so much so that on attaining a height of 100ft. the aeroplane swayed about in an apparently highly dangerous manner. But Mr. Wright managed the machine as though he were driving some mettlesome horse, and shot up higher and higher towards the line of small captive balloons which marked the height of 300ft., and which were tossed about by the high wind.

Presently the aeroplane came to the level of the balloons, but Mr. Wright did not stop. He went higher and higher, until he soared a full 100ft. above the balloons, and seemed like some huge bird Then, with a splendid circular swoop, he came lower, and after going once round the camp alighted at 4.10 just outside his shed, amid a roar of applause from the crowd that had witnessed this marvellous feat.

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Lieut. Thomas E. Selfridge, the promising young army officer who fell to his death with Orville Wright in the latter's aeroplane on September 17, was buried with military honours in the Arlington National Cemetery, which adjoins Fort Meyer, on the 25th ultimo. The loss of this brilliant officer will be keenly felt, particularly in aeronautic circles, for he was thoroughly informed in the new science, and, as the secretary of the Aerial Experiment Association, he had had much to do with the development of aeronautics in America. The various aeroplanes built by this association, all of which flew successfully, were designed by him, and the third of these, the "June Bug," on July 4 last won for the first time the *Scientific American* Trophy. Lieut. Selfridge is the first martyr to flight by a self-propelled heavier-than-air flying machine, and it seems but fitting that a suitable monument should be erected on the spot where he fell.

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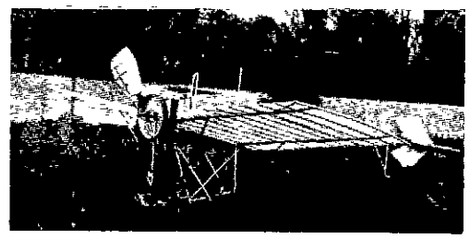
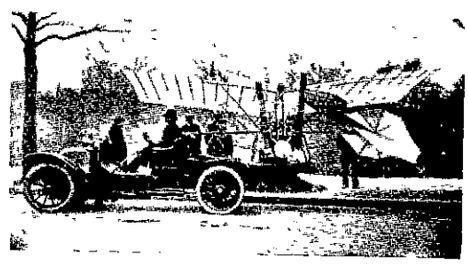
SANTOS DUMONT TO THE FRONT ONCE MORE.

After the long absence of this pioneer from the field he was the first to make his own in public at all events, it is a genuine



THE "DEMOISELLE," SANTOS DUMONT'S LATEST AEROPLANE

pleasure to read that he is once more to the front with a machine of his own design. His new machine is a monoplane driven by a 24 h.p. 8 cylinder Antoinette motor arranged on a three wheel running gear. The propellor is mounted on a hollow steel shaft running on ball bearings, and is placed on the front edge in the centre. It is six feet in diameter, with a 6½ foot pitch; it is capable of a speed of 1300 revolutions, and weighs 127.6lbs. Lateral stability is secured by two wings arranged at dihedral angle with the seat between placed three feet below; this is a position that makes for stability. The spread of the wings is five metres (16.4 feet) and the entire weight is but 297lbs. The dimensions of the wings are 2.5 by 2.1 metres. The total supporting surface is only 10.5 square metres, and with the aviator in his place the total weight



Santos Dumont transporting the "Demoiselle" on his Motor Car from Paris to St. Cyr.

to be lifted is about 411lbs., which gives a loading of the single surface of four pounds per square foot, which is the highest ratio of weight to surface that has ever been employed. Before mounting from the ground the machine must get up a speed of 36 miles an hour. On the 12th of December the inventor made several short flights without any particular difficulty. In one of these there was a rather sudden ending, the machine descending heavily on one of the wheels, which was buckled in consequence. The "Demoiselle," as M. Dumont has named his machine, is the lightest of all the aeroplanes. It was made by the Voisin factory, and the owner is in the habit of carting it about in his motor-car from Paris to the exercise ground, or anywhere else he may find convenient.

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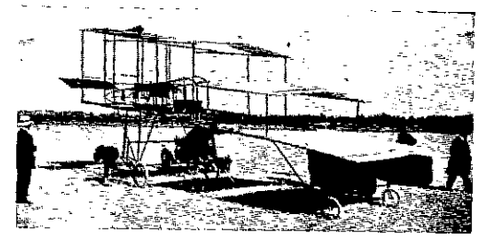
THE VOISIN FACTORY.

Of many factories the most famous is that of the Voisin Brothers, who have followed the fortunes of aviation from the first.

Of this factory, the Paris correspondent of the *Times* says:—

Messrs. Voisin Freres rank among the earliest of the pioneers of aviation in France. Captivated by the exploits of Lilienthal, which were then being made widely known by Captain Ferber, and the reports of the experiments of the Brothers Wright in America, they began a series of patient trials of apparatus, without motors of any kind, resembling that used by the Wrights. The difficulties and the dangers they encountered in the course of their experiments ultimately led them to abandon the models they had made, and to produce an entirely new type of machine of their own design. Out of these labours arose the bi-plane flying apparatus, which is now so well known, and one of which, under the guidance of Farman, has just completed the journey from Chalons to Rheims, the first direct aerial voyage in a machine of this kind accomplished by human agency.



THE DUTILLEUL AEROPLANE.
Three-quarter view, with planes arranged in steps, a horizontal rudder in front, and twin vertical rudders at the rear.

Messrs. Voisin have just occupied entirely new works, which are situated at Billancourt, on the outskirts of Paris, close to Issy les Moulineaux, where so many experiments in aviation are carried out. They comprise a very extensive erecting shop, where at the present moment four aeroplanes are in course of construction and are approaching completion, a machine shop, where the fitting up and adjustment of the mechanical portion of the apparatus is undertaken, and an experimental workshop.

In the experimental shop there is an interesting piece of apparatus intended for the trial of the bearing or supporting planes. It is actually a kind of balance. It consists of an elongated box, square in section, with sides of about 1.50 metre, and it is open at both ends. At the bottom an electric fan renders it possible to produce a current of air at any required velocity in front of the opening. The surface or the combination of surfaces it is desired to test is then placed in front of it in order to ascertain its sustaining power. The surfaces in question are supported by arms projecting from two frames, arranged on either side of the box, and these frames rest on floats which are plunged into cylindrical vessels filled with water, constituting a scale beam. In carrying out the experiment, the surfaces to be tested being

brought into position, the frame is caused, by weighting it, to assume its place horizontally, and then the blower is set to work. This forces the frame to twist round to a certain angle, and from the amount of weight found necessary to restore it to the horizontal position it becomes readily possible by a simple calculation to estimate the sustaining power of the whole surface The brothers Voisin investigate in this manner with great minuteness and accuracy the suitable forms for all the surfaces used in their aeroplanes.

The apparatus they have constructed hitherto has successfully withstood the test of actual experience, and their machines have proved their stability under conditions analogous to those in which Mr. Wilbur Wright has performed his marvellous flights. They possess, moreover, the advantage of not needing a pilot of skill and experience, as is the case with the Wright aeroplane. Their lateral stability is excellent, and in describing curves they automatically assume the requisite degree of inclination. The Voisin works can turn out four aeroplanes per month, and the cost of a machine of the Farman type is £1,000

The Voisin machines, however, have not yet been used for flights exceeding 40 to 45 minutes in duration, whereas Wright has on several occasions remained off the ground for nearly an hour and a half. The writer asked Messrs. Voisin if they could explain the cause of this inferiority in the respective performances. It is no doubt the fault of the motor, and this is the question which just now is receiving serious attention on the part of the firm.

The Science of Aviation.

(By L. J. LESH, the "Boy Aviator.")

There is probably no problem in engineering mechanics which boasts such a scarcity of reliable data as the new-found science of aviation. Countless experiments and calculations have established the art of hydrogen ballooning on a fairly stable mathematical basis, but the design of gasless or "heavier-than-air" flying machines still involves a dangerous amount of guesswork.

Aeronautical engineers who have had experience in the design of aeroplanes realise the inadequacy of the formulae and tables at our disposal to cope with new developments, and we feel seriously hampered thereby in our ambition to work out original plans which do not permit of exact calculation and verification of principles before the machine is put into the air.

However, with a fair knowledge of the general principles of flight and the design of machines, a builder should be able to construct an aeroplane (employing a high factor of safety) and to carry on his experiments safely without going into the deeper mechanics of flight, which are rather complicated and had best be left to the scientists who are perfecting these formulae and tables by means of laboratory experiments.

As this paper is to deal exclusively with aeroplanes, I will not consider other types of flyer such as the gyro-plane, helicopter, and ornithopter.

After constructing and testing many different types of aeroplane, experimenters have produced three general types of machine which can prove their ability to take to the air under favourable conditions and stay aloft until the motor gives out or an accident occurs to the wings or rudders These types are the monoplane, invented by Lilienthal and reaching its highest development to date in the Bleriot and R. E P. machines; the following surface flyer invented by Professor Langley and copied by Bleriot; the Chanute types (two-deck, three-deck, and multiple wing) invented by Octave Chanute, perfected in part by the Wright Brothers, and imitated by Santos Dumont and the Voison Freres, constructors of the Delagrange and Farman flyers.

The monoplane flyer has met with considerable favour among designers because of its similarity to the soaring birds which give us daily proof that flying can be accomplished on wings of the monoplane plan. The simplicity of this type also makes it comparatively easy to calculate beforehand the exact values of the wings and the power required for propulsion, thus giving the engineer who adopts this design something of an advantage over the experimenter who plans a machine of the Langley or Chanute types

The principal disadvantage of the single-plane flyer is its lack of inherent stability during flight, since it is quite out of the question to devise artificial surfaces which duplicate the complicated balancing movements of the soaring bird's wing

Experimenters have attempted to balance monoplanes by shifting weights and by various vertical and horizontal rudders, but these methods of control are seldom resorted to by the birds, and in adopting them for their machines, inventors have imitated Nature's design without following her excellent example as to principles of operation In this connection it might be well to call attention to the fact that one experimenter at least attempted to build a machine that would duplicate the soaring of birds as he explained the phenomenon after thirty years of observation, but he did not live to realise his ambition.

This man was Louis Pierre Mouillard, a wonderfully patient and accurate observer, who was unfortunate, however, in his methods of experiment and finally became despondent through his failure to launch a machine which was probably quite capable of soaring had it been skilfully manipulated He was enabled to carry on his work through the generosity of O. Chanute and it now seems that if he had adopted that excellent engineer's methods of experiment he would have excelled the performance of Lilienthal and probably equaled the flights of the Wright glider.

The monoplane in its simplest form, as devised by Lilienthal, was intended merely for experiments in gliding flight, and since the whole weight carried through the air was not very great, it was a comparatively simple matter for the aviator to balance the wings during wind gusts by shifting his weight. Such an apparatus, spreading some 200 square feet of supporting surface, can be made of wood, wire, and cloth so as to weigh about fifty pounds; but when the surfaces are enlarged and a motor added, the disturbing forces cannot be met by shifting the centre of gravity and new controlling influences must be utilised to maintain the equilibruim.

If the main supporting surfaces are rigid and shaped to the plan, curvature, and attitude of the soaring or sailing birds (wings tilted upward at a dihedral angle as the buzzard or arched downward in the attitude of the sea gull), then the main disturbances to be overcome are, first, fore-and-aft oscillation resulting in dangerous downward plunges; second, lateral oscillation during changes in direction and velocity of the wind.

Fore-and-Aft Stability.—This problem may be solved by hinging the sustaining wings in such a way as to permit their flexing backward and forward, adjusting the centre of pressure to the variations in velocity of the wind and to changes in the angle of incidence of the machine to the air current.

This is the way of the birds and it was adopted by Mouillard and later by Chanute, who utilised the principle to good effect in his multiple wing glider, but the device has never to my knowledge been tested on a motor-driven flyer. Present-day experimenters prefer to maintain fore-and-aft balance by means of horizontal rudders and shifting weights or merely by accelerating and retarding the motor. Any one of these methods might be sufficient for ordinary conditions but they are certainly inferior to the way of Nature, which is positive under all conditions and has the advantage of automatic action which leaves the aviator free to attend to other things connected with the machine's management.

Lateral Stability.—The second problem constitutes the principal drawback to the development of aeroplanes whether they be of the monoplane, multi-plane, Langley, or Chanute type and as yet no satisfactory solution of the problem has ever been made public. Some few experimenters have made indifferent attempts to maintain lateral balance by means of some special attitude of the wings, shifting weights, or vertical keels, but the greater proportion of designers are either entirely ignorant of the importance of this feature, or they purposely ignore it for reasons that reflect no credit on their inventive ability.

The writer made a careful study of the problem of lateral balance during experiments with ten different aeroplanes, but this work had to be supplemented by several months of concentrated theoritical investigation before a satisfactory plan was found.

The Naval Aeroplane.

In spite of the final wrecking of his machine, the results achieved by Wright in the army tests at Fort Myer have proved so convincing, that one of the Navy Department bureaus is seriously investigating the question of their usefulness for scouting on the high seas. At the first blush, the proposal to transfer the aeroplane from the land to the sea will seem to many people to be a mere multiplication of the many and serious risks attending the operations of the aeroplane on land. "How will the machine start?" it will be asked. "How make a landing?" "And how will its half ton of weight be supported when it is afloat?" On considering the problem a little more closely, however, it begins to be evident that so far as the difficulties of starting and landing, etc., are concerned, they can, with a little ingenuity and proper design, be so far overcome, that the aeroplane may be, at least in the present stage of the art, handled more easily, and with less peril to the navigator, than it is under present conditions.

The navy is so far of this belief, that Lieut. George C. Sweet, of the Bureau of Equipment, is, we understand, working on the plans of a naval aeroplane, designed to

be carried by our warships and co-operate with them in naval manoeuvres. The changes which would be necessary to transform a military into a naval aeroplane are not by any means radical, and involve merely the substitution, for the present skids or runners of the Wright machine, or the bicycle wheels used by the Farman type, of some form of boat-like structure, possessing sufficient displacement to carry the weight of the aeroplane. Although the Lieutenant naturally is not making public his plans at this time, it is fairly certain that a pair of long, narrow, and finely-modelled hulls, attached below the machine, will be substituted for the present wheels or runners. These must necessarily weigh more than the Wright brothers' skids; but they need not be so very much heavier than the cumbersome wheels and framing of the French machines. When we remember that although the racing skiff used in sculling races weighs only 25 to 27 pounds, it is capable of carrying an oarsman weighing 200 pounds, it would seem to be quite practicable to build two shells weighing but little more than the carrying equipment of a land aeroplane, each capable of carrying half the weight of the machine, or say 500 pounds. Compared with the difficulties of starting on land, the naval aeroplane would be at a distinct advantage. Our battleships are capable of making from 18 to 20 miles, and our cruisers from 23 to 30 miles an hour. This last is the speed of our fast scout cruisers of the "Salem" class; and it would be more than sufficient to enable the Wright machine to rise into the air and commence its flight. In practice, the aeroplane, furnished with its pair of shells, would be placed upon the fore deck, and the ship turned head to wind. When the speed of the ship through the air approached the proper velocity, the aeroplane engines would be started, and the machine would leave the vessel at a height of from 20 to 30 feet above the sea. The aerial scout, rising high into the air, would command a vast field of observation, and possessing a speed nearly double that of the warship, it could, upon discovering the enemy, quickly pass over him for purposes of observation. On returning to the parent ship, the machine would swing round into the wind and come down gradually until it rested on its shells, when it could be towed alongside and taken on board by a boat crane.

It is not denied that in carrying out these operations, serious difficulties might be encountered. For the present, at least, and until the aeroplane has been greatly improved in stability, power, and ease of handling, it would be impossible to make any such flight as above described in rough weather; but in calm weather, and even in moderate breezes with an easy sea, we can see no reason why it should not be accomplished. We are moving fast in these days, and the wonderful flights of the Wright brothers have so far established confidence in aeroplane flight that the attempt to produce a naval aeroplane will be watched with the greatest interest, and no small degree of optimism.

New British Army Aeroplane.

A newspaper has surprised the world with the announcement that the British Army department of ballooning has surpassed all records of aviation with a new aeroplane. It is the result of experiments conducted in remote parts of the country for many months. Patriotism inclines us to believe, but prudence makes us sceptical, especially after reading of the last public appearance of the aeroplane which Mr. Cody is perfecting leisurely for the British Army On January 6th the machine was dragged out at Farnborough, in presence of Colonel Capper and some twenty spectators, and performed. For a time the inventor explained the difference between this brilliant success and the previous failures of somewhat similar pattern. Then he careered backwards and forwards along the ground with a squad of engineers hanging on, and on the return journey to the balloon enclosure "the front wheels once left the ground for the fraction of a second" It is at all events clear that the new machine can not have been the offspring of Mr. Cody's brain.

French Minister of Public Works.

After winning the Michelin Cup Mr. Wilbur Wright took Mr. Barthou, the Minister of Public Works, with him and kept him in the air and going hard for four minutes (3min. 58sec. to be precise), after which the pair proceeded to Lemans and were entertained at a "vin d'honneur."

With the Aerial Experimental Association's Second Aeroplane.

The first aeroplane of this Association was described (with an illustration) recently in PROGRESS, and its flight of 318 feet chronicled. It came to grief through the buckling of the tail material, as described at the time. A new one, known as "White Wing," has been constructed by the Association, and though it has not managed to fly more than 1007 feet, and that with one "touch," it is spoken of with great respect by the critics of the American side, who find in it some very good points, as one might expect from connection with the inventive genius of Dr Graham-Bell These may be recognised in the description (*Scientific American's*) we publish; but it is also recognisable that there are many defects such as the need for example of a special track for enabling the machine to rise. From the published description we take the following:—

Beside the horizontal rudder in front for controlling the elevation of the aeroplane and maintaining its fore and aft equilibrium, there is the usual vertical rudder for side steering in the middle of the box tail, while in addition to this the wing tips are pivoted horizontally about their forward edges and made to move up and down slightly in turning a corner by means of a cord which runs through pulleys at the rear corners of the upper plane, and which is attached to the aviator's body. The instinctive leaning to one side of the aviator in making a turn is thus used to set the wing tips properly.

The new aeroplane has double superposed surfaces There are two distinctive features in the design. The first is the general principle and arrangement of the truss which supports the two surfaces, and the second is the shape of the surfaces themselves.

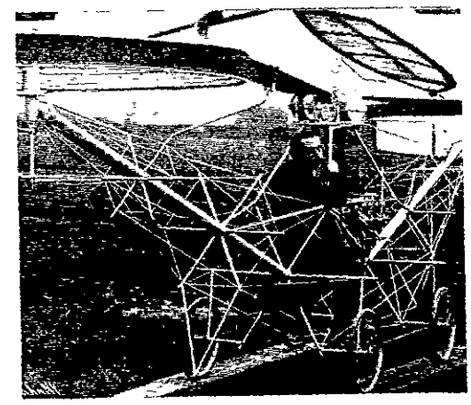
In this machine the truss differs radically from ordinary designs, being a double bowstring truss, which was found to have structural advantages over the flat bridge design commonly used. The other features which distinguish the machine from the usual type of double-deck machines lie in the shape of the supporting surfaces, which are very much like a bird's wing in plan, tapering toward the tips, and at the same time decreasing in curvature

A wooden propeller is used, with an eight-cylinder 40 horse-power Curtiss air-cooled motor The propeller's diameter is 6 feet 2 inches. The pitch is about equal in diameter. At about 1,200 R.P M., with the motor developing 25 horse-power, the propeller develops some 245 pounds thrust. The aeroplane is 42 feet 6 inches long from tip to tip, and 4 feet deep at the outside panel. It has a total supporting surface of 408 square feet, while its weight is 431 pounds.

In flight, the lateral stability of this machine was remarkable. In appearance the machine is the same as the first built by the Association, which was illustrated in one of our recent issues.

The Cornu Heliocopter.

A distinct type is the Helicopter of M. Cornu, of Paris, an illustration of which appears in the recent issue. A French writer thus describes the machine.—The helicopter consists of a main frame in the shape of a wide U. This frame is made of large diameter, thin steel tubing, and each arm of it is reinforced by three sets of six small tubes each, placed at right angles to the main tube and having their ends connected by light steel cables forming a hexagon, while longitudinal guys also run from the outer ends of the large main tubes over the tips of the smaller ones. In the middle of the Z-shaped frame thus formed, is mounted an 8-cylinder Antoinette motor of 24 horse-power. The frame is mounted upon four pneumatic-tired



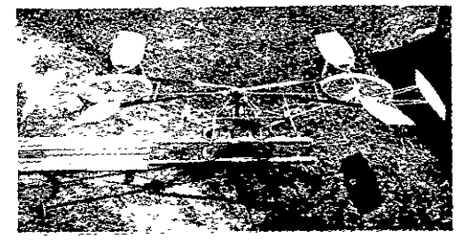
CORNU HELICOPTER—THE AVIATOR'S SEAT

wire wheels. Its total length is 6.2 meters (20.34 feet), and its weight, including the four wheels, is 50 kilogrammes (110¼ pounds).

The aviator's seat is located at one end of the motor in the centre of the frame The motor is provided with a pulley for a 100-millimeter (3.93 inches) wide belt on this end, and this enables it to drive the two large wire-spoked pulleys that carry the propeller blades. The belt used is 22 meters long (72 18 feet).

The propellors are of variable pitch, and the changing of the pitch is accomplished by means of wire cables attached on one hand to the edges of the pulley, and, on the other, to the rearmost edge of the blade frame at about two-thirds of its length after first passing over a fixed pin on the forward edge of said frame. The system is double, in order to withstand the sudden strains produced in starting and stopping. Thus it can be seen the blade is entirely a tension member, and the pull on the cables, combined with the rotation of the inner ends of the blades, permits the variation of pitch. The total weight of a propellor complete is 24½ kilogrammes (54 pounds).

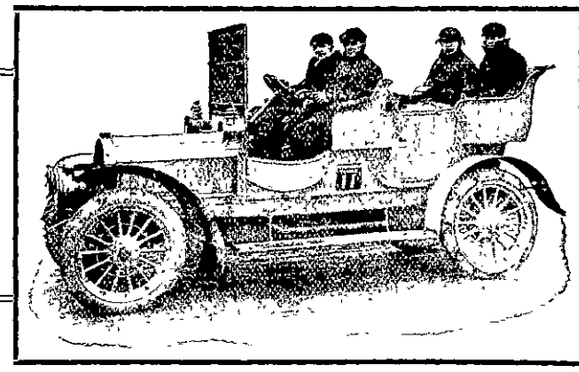
After it has risen in the air, the helicopter is propelled forward by the down draft of air against the two inclined planes located at each end of the apparatus. These planes consist of frames of flattened steel tubes covered with silk. They are 2½ meters (8 2 feet) long by 60 centimeters



CORNU HELICOPTER—GENERAL VIEW.

(1.97 feet) wide. They are arranged to pivot on a horizontal axis passing through their centre from end to end, and mounted on two supports extending out from below the centre of the pulley hub The inclination of the planes causes the forward movement of the helicopter, while by swinging them around to the desired point, the machines can be made to turn to the right or left. They are arranged to be operated by two levers conveniently placed beside the operator. In making a circle, the planes are not set parallel with respect to the longitudinal axis of the machine, but they are both turned to one side or the other of said longitudinal axis, so that they are in line with two radii of the circle which the machine is describing. The total weight of these planes is 9 kilogrammes (19 84 pounds).

Motors Motoring



Motors, Motorists, and Motor Matters.

In England the war of prejudice against motorists continues unabated. At Cambridge the University authorities are imposing galling restrictions that will make it virtually impossible for the average student to motor and preserve his self-respect. Every petty vestryman of the shires seems to spend half his time devising schemes to trick the motorist to his undoing. The land is close set with police-traps, and at every likely corner stands the parish constable, watch in hand, grimly waiting to drop on some motorist—greatly to the joy, one supposes, of the criminal classes. The London County Council has closed the parks to persons learning to drive motors, who have profited much by their practice in unfrequented corners, and harmed nobody. In short, the persecution of the motorist is at its height, and the thing has gone so far that there is some reason to hope that pretty soon now we shall have the recoil to common-sense.

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It must be remembered that with all this English talk of the danger of motor vehicles, there is a far higher percentage of accidents caused by horse-drawn vehicles than by autocars. But human nature in the parishes is as queer a thing in 1909 as it was in 1606. When a brewer's dray or a grocer's cart knocks down and kills somebody, there is a murmuring of sympathy, a perfunctory inquest, and the incident is closed. But if an autocar runs over a hen, all the provincial papers come out with scare headlines about the "Toll of the Motor." Police misstatements as to motorists run pretty close to the perjury line, and the average magistrate (who thinks nothing but the thoughts of his forefathers) almost invariably backs the police. Lord Savile, himself a magistrate, but modern, has formulated a definite complaint. He alleges that the evidence of the police is not always trustworthy, and that all sensible and unprejudiced magistrates agree that the police would be far better employed in endeavouring to catch murderers and burglars, who now pursue their callings without interruption, because the officers are lying behind fences, trapping unoffending motorists who may be exceeding the speed-limit by two miles an hour on a clear road. Unhappily for the motorists, most fortunately for the burglars, sensible and unprejudiced magistrates are rarer in the smaller towns of England than daisies in December.

* * *

In New Zealand things are better. We are not pledged to keep inviolate any outworn tradition of the Tudor period, and we are not of necessity haters of new things. In the English counties, Mr. Justice Shallow and his myrmidons object to motorcars, just as they objected to railway trains and steel pens. "Our ancestors," they say, in effect, "knew nothing of these things; wherefore, these things are vile, and must be put down." This essential contagion of parochialism lies heavily on England It is in the kitchen, and in the War Office All the good squires and their relations are proud of it. Motorists in New Zealand owe much of their reasonable liberty to the fact that there are no squires, and few men can trace their ancestry beyond the second step back. And some part of the liberty enjoyed is doubtless due to the fact that New Zealand motorists are, as a class, keener on keeping the law than on breaking it. They do not suffer the irritation of a constant conspiracy to annoy, and thus they look with friendly eyes on policemen, country justices, pedestrians, and roadside hens.

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D.V., who seems to be a somewhat extravagant person, writes to PROGRESS:—I am not a motoring man. I don't know anything about the machines. Although I have smelt them for years now, I only had my first ride the other day. And my hair is still standing. I know a man who has recently been learning to drive, and when I met him on the day I am talking about he said he had learnt it all. That was at Khandallah. He said he should drive me into town, and I timidly murmured a grieved assent. I climbed into the affair and sat beside him. He pulled on a big pair of gloves, set his jaws, squawked with the tooter thing, and the machine jumped for the Ngahauranga Gorge. The Gorge is a complex drop, full of sharp twists and dangerous indecisions; and my man, who had now learned, did most of the distance flying. When he kept the road, he was either skirting a precipice or grazing a cliff; but half the time he was hitting things, and leaping forward like a kangaroo. At one point there is a long loop in the road. He didn't take the turn quickly enough, so the car jumped over. It was only our speed saved us. While we sailed through the air I looked over the side into a blue profundity and prayerfully prepared for the worst. It was my first experience of an aeroplane, and I knew that Wilbur Wright must be a very brave and reckless man. But fortune favours the idiotic; just as I was prepared to die we struck the road again on a slant and skidded on one wheel round the hundred yards or so of the next curve. Then we grazed the fronts of several cottages, stampeded fourteen dogs, and finally fell noisily on Kaiwarra. My man told me that driving a motor was the easiest thing on earth, once a chap had learnt how. I told him I was quite convinced of it.

As to aeroplanes (or aerodromes—take your choice) you will find an admirable article on the Wrights' achievements in the last number of *Everybody's Magazine*. Among a multitude of hoppers and gliders, Farman and one or two others have flown with some success; but there is adequate proof that the Wrights are now flying with complete confidence and security. They have solved the problem, so far as aeroplanes are concerned But there are essential limitations to the possibilities of the new thing. With motors as they are, with aeroplanes of strictly limited carrying capacity, the new flyers can make no very long flights. But, even now, they may revolutionise warfare. An aeroplane like the Wrights could easily sweep over a fort and by dropping one charge shatter it to dust. It marks, for war purposes, an almost infinite advance on the balloon idea. For this reason, it is curious to note that the English War Office has not secured the Wright or the Farman aeroplane, but is still experimenting with hoppers and gliders. The lessons of the Boer War are forgotten, and the War Office remains the stodgiest and dullest department in Britain. It is merely a higher extension of the stodginess and dullness that leads to the persecution of motorists in the rural districts and provincial towns. If somebody doesn't wake up soon, there'll be a good deal to be anxious about

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The growing popularity of small cars becomes more notable in Europe every day. In the English Midlands, the principal demand is for cars from 8 h.p. to 16 h.p., at prices from £200 to £350. South Wales demands cars of from 12 to 15 h.p., four-cylinder, two or five seated. And so it is right through. People of moderate means (the average motorists, that is to say) are getting tired of heavy cars that are costly in up-keep and offer no special compensating advantages. In short, the instinct of empty display is passing, the peacock period is well-nigh spent.

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The introduction of taxicabs in Melbourne is causing much discontent among the drivers of ordinary hansoms. The drivers of the taxis. are smartly dressed, courteous, intelligent fellows, and their charge is regulated to a penny by the useful little dial. Also, the vehicles are clean, comfortable, and swift. Cabbie of the hansoms sees his livelihood threatened; but Cabbie of the hansoms has himself to blame in large measure. Melbourne cabfares, as fixed by law, are not excessive, but Melbourne cabmen are keen on any chance to extort money. Meantime, while we have no knowledge of taxicabs coming to Wellington yet, they are coming to Christchurch. It is an excellent thing that they should come; and the sooner they come to the capital, the better. The by-law regulating cabfares in Wellington is a farce in practice. Scores of people who can afford

cabs will not take them, because of the exorbitant fares demanded. Passengers arriving in the city by rail and boat are fleeced every day. The man who is cute enough to put on a line of taxicabs in Wellington will make money.

* * *

Aberdeenshire is noted for drunkenness, social squalour (items not specified), Sunday religion, and excessive lip-morality. Also, any man convicted of humour in Aberdeen falls at once under suspicion of atheism—if not worse. For this reason, one is interested to note the opinion of an Aberdeenshire County Councillor that "no man, from the Prime Minister downwards, can be trusted to drive a motor-car and retain his integrity."

* * *

Very commendable are the orders issued by Sir Frederick Milner to his chauffeur.—1. To keep within the speed limit as far as he can, even on the open roads. 2. To slow down to under ten miles at every danger signal, or at any turning where he cannot clearly see what is on the road. 3. Never to exceed ten miles in any village, whether the road is clear or not. 4. To give the widest possible berth to all traffic, whether wheeled, bicycles, or pedestrians. 5. To pull up at once if any animal shows sign of nervousness, or if the driver or rider holds up his hand.

* * *

From America comes a set of rules for pedestrians, which, though quite too good to be true, will yield some modicum of gentle joy to the harrassed automobilist:—

1.—Pedestrians crossing streets at night shall wear a white light in front and a red light in the rear.

2.—Before turning to the right or left they shall give three short blasts on a horn at least three inches in diameter.

3.—When an inexperienced automobile driver is made nervous by a pedestrian, he shall indicate the same, and the pedestrian shall hide behind a tree until the automobile has passed.

4.—Pedestrians shall not carry in their pockets any sharp substances which are liable to cut automobile tyres.

5.—In dodging automobiles, pedestrians shall not run more than seven miles an hour.

6.—Pedestrians must register at the beginning of each year and pay a licence fee for the privilege of living. There shall be no rebate if they do not live through the entire year.

7.—Pedestrians will not be allowed to emit cigarette smoke on any thoroughfare in an offensive or unnecessary manner.

8.—Each pedestrian before receiving his licence to walk upon a highway must demonstrate before an examining board his skill in dodging, leaping, crawling and extricating himself from machinery.

9.—Pedestrians will be held responsible for all damages done to automobiles or their occupants by collision.

* * *

Despite all this talk we hear of the awakening of China, the average Chinese in his homeland has a profound dislike for every sort of motor. He takes this to be the latest and worst expression of the utter devilishness of the Foreign Devils. It disturbs his deeply-rooted belief in immemorial observances. So that recently great dissatisfaction resulted when an irrepressible Frenchman, rich in faith, established a garage in Pekin. The man from Paris would seem to be somewhat of a humourist in his way, for he opened his shop in the Street of Great Tranquility.

* * *

But outside China the Chinese generally take kindly enough to these very modern inventions. The Straits Chinese in Singapore have among them some of the best fellows in Asia, and some of these are very cheerful motorists. They have been enthusiastic cyclists for many years past. The roads in the island are excellent. The climate (which has been grossly maligned by a multitude of persons with no authority) is equable and good. European residents, who live their glad lives joyously enough, are enthusiastic motorists. It is a very mixed community—one census there were two Esquimaux included in the returns—and there are all sorts of cars in the settlement. All that Malayan country offers great attractions to the tourists, partly because most of it is as yet unspoiled by globe-trotters.

* * *

Motorists in America have discovered a new amusement of apparently endless possibilities—the application of the speedometer to the testing and comparison of animal speeds. A jack-rabbit (an animal closely akin to our hare) paced a car in Kansas, at a speed varying in eleven miles from thirty-eight to forty-two miles an hour. A cotton-tail rabbit went from twenty-three to twenty-six miles an hour. A two-year-old steer went at eighteen miles an hour and "hated to be conquered." A horse, on the other hand, invariably dodges the contest, bolting up the first side road. One's ideas of the wisdom of fowls need to be revised in the light of these American experiments. Thus it was discovered that the goose invariably gets off the road when a car approaches, while a hen gets hazed and flurried, and can't make up her mind whether she shall race the car or take one side or the other. The turkey stands on its dignity, "sometimes a trifle too long," and is not as cautious as the goose.

* * *

A PROGRESS man, loaded with these facts and a considerable supper, dreamt that he was driving a car from Wellington to the Hutt, earnestly on the look-out for natural phenomena. A police constable, chasing Archibald McNeill, was found to be making two miles an hour. A railway train between Petone and Lower Hutt got up to seven and a-half. A quarryman, making for a place of refreshment (9.55 p.m.) taxed the machine as he reeled off thirty-three. A politician who had been dining out did one and an eighth in 3,455 zigzags. No hens or rabbits entered, and it was too soon after Christmas to hope for a goose.

* *

Even in regard to the innocent sport of motoring, international complications may ensue. The other day in London, a chauffeur was charged with exceeding the speed limit. He faced the Bench with a bold front. "I don't think you can interfere with me," he said. "I have orders to drive fast, as I have royalty on board." It proved that the young man had been driving the Sultan of Zanzibar. Now, the idea of royalty, plain or coloured, does mightily impress and overawe any English magistrate, and the plea that sovereigns were exempt from all laws regulating speed hit the magistrate concerned very hard. He made haste to adjourn the case until the chauffeur should produce his authority. Presumably, when the chauffeur produced proof, he received an abundant apology, a pension, and the freedom of the City of London; but as the mail left before the case was decided, all that is mere matter of conjecture.

*

The first definite reference to motors and motorists will be found in the writings of Job, the esteemed philosopher of Uz. "They turn the needy out of the way; the poor of the earth hide themselves together. . . . They are wet with the showers of the mountains, and embrace the rock for want of a shelter. . . . He draweth also the mighty with his power; he riseth up, and no man is sure of life." Job was probably a magistrate.

* * *

The Emperor of Austria took his first motor ride the other day. It had taken the court experts a good many years to decide whether the Emperor could do a thing like that without some forfeiture of his dignity.

* * *

During the recent period of military activity in Roumania, the Prefect of Police drew lots, and called on a number of automobilists to lend their cars and their services in connection with the scheme of mobilisation. The response was generous and ready, and the effect of the trials proved entirely satisfactory. Only one motorist shirked his patriotic obligation. He hid a part of his engine, and pleaded that his machine was out of order. For that piece of folly and greed he is to stand his trial in the criminal court.

* * *

The total number of motor vehicles registered in London up to the end of November last was 36,044, and 92,912 drivers' licences had been issued since the passing of the Motor Car Act. There are now 2,200 motor cabs plying for hire in the city, and all the indications point to the probability that the cab horse has to go, as the 'bus horse has gone. As comparatively few cabmen learn to drive the motor cabs, the outlook for the ordinary cabby is grave. But it is no worse than the outlook for the average ordinary compositor became when the linotype was introduced.

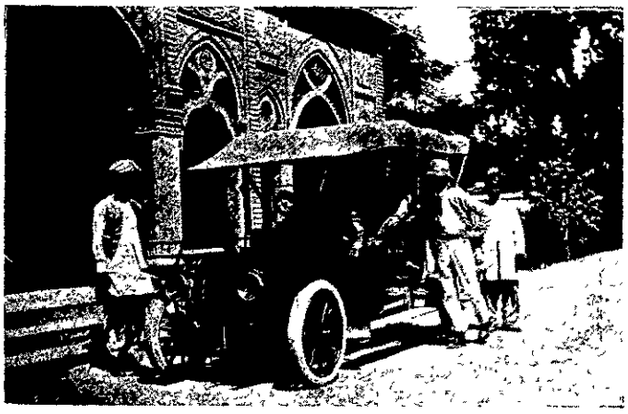
* * *

In this connection the registering for the United Kingdom is interesting. The figures to Sept. 30 last were supplied by the Registrations Officer to the Royal Automobile Club, and have just reached the Dominion. The number of vehicles registered up to September 30, 1908, is shown to be 154 391, of which 71,381 were for private use, 12,104 for trade purposes, and 5,880 as public conveyances with 65,026 motor cycles. Of the total number 137,345 motor vehicles belong to England and Wales, 10,907 to Scotland, and the remaining 6,139 to Ireland. The County of London necessarily claims the greatest figure, namely, 34,908, which shows an increase of about 175 per cent. in the three years. The 1908 total of 154,391 compares with 74,308 (including 37,665 motor-cycles) in 1905. It is interesting to note that the total number of vehicles on December 31, 1904, was 51,549, of which 27,348 were motor cycles.

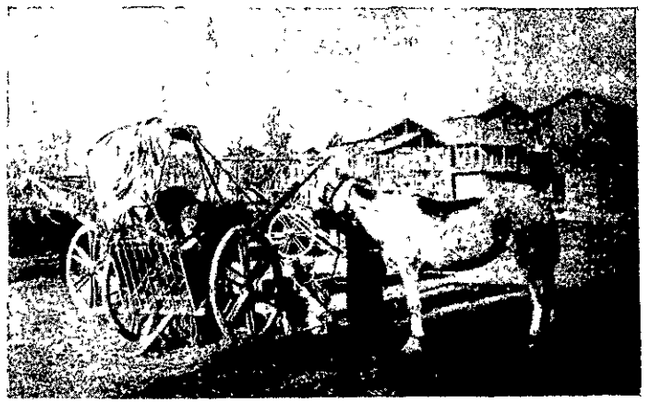
* * *

Some interesting facts are given that go to explain the growing popularity in England of small-powered cars. A single-cylinder Sizaire-Naudin car travelled in various parts of England 7,713 miles between August 3rd and September 14th. Total cost of running, including petrol, oil, and garage charges, £30 9s 7d. Three hundred and fifteen gallons of petrol were used, and twenty-one gallons of lubricating oil. The cost works out at a slight shade over a penny a mile, inclusive of all charges. It will be seen that such a car, kept at home and used for ordinary purposes of pleasure, would be a very inexpensive luxury. Of course it would cost more out here, but everything costs more out here. And the theory is that everybody makes more.

FROM RAWALPINDI TO SRINAGAR (KASHMIR).



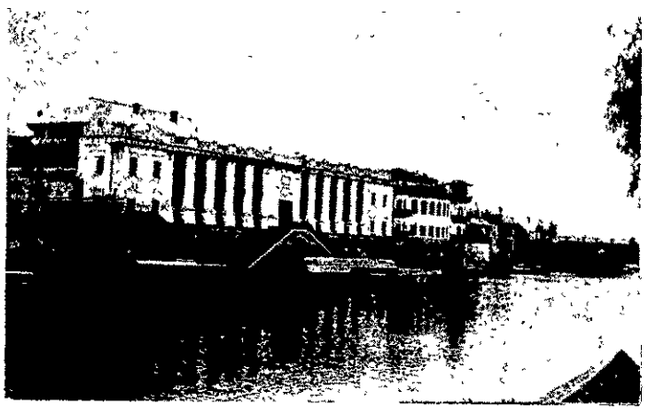
The Start from Rawalpindi. Mr Lamour at the wheel.



Bullock Carts on the way, Kohala

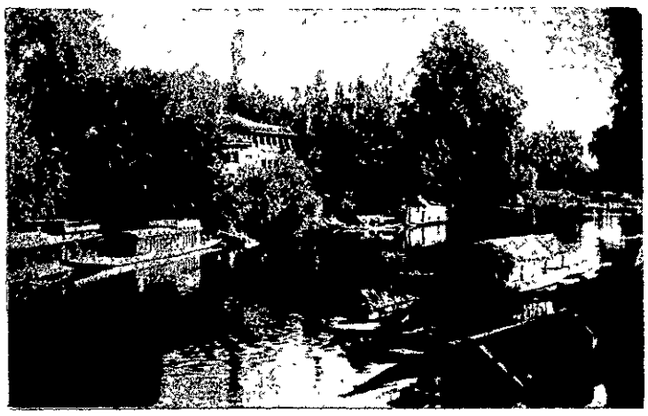
"Tongas" at Uri.

A Native "Ekka," Srinagar



H H the Maharajah's Palace, Srinagar

The Native City Srinagar.



The Chenar Bagh, Srinagar

The Old Canal, Srinagar

By Unfrequented Roads.

Rawal Pindi to Srinagar.

When this interviewer was a newspaper colt in Calcutta, Mr. C. C. Larmour was a trusted officer of one of the big Indian banking corporations. Then, as the years slipped by, he became an enthusiastic motorist. He became familiar with the main roads and byways of the great country, the valleys and the hills. And fondness for the motor, backed by much experience in all sorts of climates in all sorts of roads,, begat such familiarity with engines and cars that to-day Mr. Larmour is practicing as a motor engineer in Wellington. Of his many out-of-the-way tours in India, this is the brief story of one, told pretty much as he tells it.

"Yes, I motored pretty well everywhere, at one time or another. India's an enthralling country to motor in, spite of drawbacks. Experiences? My dear chap, life in India is a long and continuous chain of experiences; you know that as well as I do. Touring experiences, you mean? Well, I've driven my car all over the Indian frontier, from Dera Ismail Khan to Peshawur, and right up to the Malakand. As far as motorists go, it is a region of unfrequented roads. You don't find repairing shops and garages at convenient intervals. A man has to take his risks on his own shoulders.

"I remember a trip I made a short time ago from Rawal Pindi to Srinagar. Car a 15 h.p. De Dion. I started at ten o'clock one morning towards the end of October, and reached Tret (3000 feet) at 12.30. Went right on, and reached Murree (7200 feet) at 3 p.m. Changed water three times going up. The first sixteen miles out from Pindi is a steady slow up-gradient. Then there are nine miles up and down through low hills. Then there is a fourteen miles straight climb to the 7000 feet level. I left Murree after an hour's stay, and freewheeled to Kohala—twenty-six miles down hill to the 1500 feet level. On the run down I went into the back of a bullock-cart, with the result that the radiator began leaking. I got it repaired at a local tinsmith's. Bullock-carts are one of the standing nuisances of those rough roads. Despite their good intentions, they always seem to do the thing they shouldn't do, and the last thing you could reasonably expect of them. Still, I got into Kohala without serious casualties, and put in the night there.

"You have stayed in dak-bungalows. So have I. Why re-open these old wounds? The dak-bungalows on this trip were just about the same as one finds everywhere—populous with fleas and things, full of a haunting mustiness, devoid of the slightest suggestion of homely comfort. The usual things to eat—stringy fowls of most uncertain flavour, vegetables that are mysteries indeed, curries that are occasionally passable. But in a country where hotels are few and far between, one has every reason to be thankful for the dak-bungalows.

"I set out from Kohala, at six o'clock next morning. From this point there is a steady incline right up the valley of the Jhelum. I reached Domel at eight o'clock and breakfasted there. At nine o'clock I ran through Gurhi, and at 10.30 I ran into a wash of rain. At two in the afternoon, three miles short of Chikoti, I found that a bridge I was to cross had disappeared. The car was carried across slung on poles by forty coolies, and at six o'clock I got into Uri. It was still raining—the sort of rain that seems to penetrate to one's bone, but not especially uncomfortable in that temperature. I had another night in a dak-bungalow, and was on the road again at eight o'clock next morning. At ten I passed the Mohurra Electric Works, and at 11.30 I ran into Baramulla. I left there again at 12.30, and reached Srinagar at two.

"That is a bald statement of route. The rest you must fill in for yourself—the stupendous loveliness of the typical Himalayan scenery, the odour of the pines and deodars, the unspeakable badness of the roads, and all that. And you can put in what you please concerning what you remember of the quaint, compelling picturesqueness of Srinagar. The capital of Kashmir is very beautiful, and it has been beautifully described, times out of number. The Maharaja of Kashmir and Jammu is Sir Pertab Singh, K.C.S.I. His brother is General Raja Sir Amar Singh, Commander-in-Chief of the Kashmir army. Very charming men, both of them. The Maharaja owns a Sunbeam car. The Maharaja is in many respects an enviable person. He has a delightful estate, and a delicious capital in the valley of the Jhelum river—a wonderful valley seventy miles long by forty broad, with an average elevation of 4,000 feet. The climate is superb. You have Tom Moore's solemn assurance that one Kashmiri woman was marvellously beautiful, although you would never have guessed it for yourself. There is any quantity of game—good shooting everywhere—barasingh (the Kashmir stag), markhaw, ovis ammon, ovis poli, all sorts of animals. During the season, too, the Mahsir fishing is as good as any in India. The Jhelum is a huge tumultuous torrent most of the time. It brings down sleepers for the railway from the enormous forests up above. The road through from Kohala (135 miles) follows the valley of the Jhelum. It is much frequented by tongas, bullock-carts, and ekkas—all very picturesque and quite in the picture, but all a dreadful nuisance to the motorist You have ridden in an ekka? Then you, too, know the anguish of motion. A ride on camelback is absolute repose by comparison. The road is dangerous enough in many places, quite apart from the vehicular obstructions. There are many hairpin-bends in it; it is sometimes very narrow, and often villainously bad; the ruts at times are veritable chasms.

"My car went through bravely. I had no trouble of any sort. The only part that had to be adjusted right through was the contact-breaker, and the water had to be changed frequently and occasional stoppages made to allow it to cool down. The secret of enjoyable touring is to tour in a car that you can trust.

"Yes, it's a great country for motoring, and it will be better. As the number of tourists increases, the roads, where they are bad, will be improved. There is plenty of labour, and the Government of India is a Government of keen intelligence. The more people visit India, the better will India be understood, and the better India is understood the better it will be for all concerned. There are grave problems to be faced out there, and when ignorance and prejudice operate in other parts of the Empire, new hindrances are put in the way of the settlement of those problems."

Mr. C. C. Larmour has recently established himself in Wellington as a practical motor engineer and specialist, after many years of experience in India and Europe. Mr. Larmour will gladly give motorists the benefit of his unbiased opinion on all matters concerning motors, tyres, etc. He does not represent any particular maker of cars, and makes repairs a speciality, which he attends to personally at the residence of car owners. Intending purchasers of cars should call on, or correspond with, Mr. Larmour at 11 Norwich Chambers, opposite the Bank of New Zealand.

Death of Mr. Singer, tke Cycle King.

Mr. Singer, who died of apoplexy on January 4th last, had a remarkable career. He started as a mechanic in the works of Penn and Co., of Lewisham, spent the late sixties in the sewing machine department of the Manchester Company, and started in the early eighties as a cycle maker on his own account. Being one of a very few in the business at the time, and having very inventive brains and much enterprise, he soon made a fortune. About the middle eighties he got into the hands of the notorious Hooley, who floated the business into a company on a capital of £600,000 and debentures £200,000. The rush for shares was phenomenal, but the subsequent profits were not. At the outset of his career as a manufacturer Mr. Singer owed a great deal to his name, the world having got it into his head that he was the Singer of the sewing machine celebrity, and the mistake proved worth a good deal to him financially and from the advertisement point of view. The world only learnt the truth at Mr. Singer's Jubilee celebration in 1907, when he assembled a vast number of friends at the Hotel Metropole in London. There were toasts and reminiscences as usual on such occasions, and the truth about the name came out then. In later years Mr. Singer had a distinguished connection with the motor industry. His magnificent mansion in the suburbs of Coventry has long been the talk of the Midlands, where gorgeous stories are current of the hospitalities of the Cycle King, Alderman, and generous subscriber to the funds of the Liberal Party. Among the guests who have there been entertained royally was Lord Morley, for whom the late Mr. Singer had much veneration.

There is a movement afoot in England to help deserving girls into the motor-driving business. As to the ability of girls to drive there can be no doubt whatever, since many ladies are expert drivers. But the coming of the chauffeuse—if she is to come—opens a fertile field for conjecture.

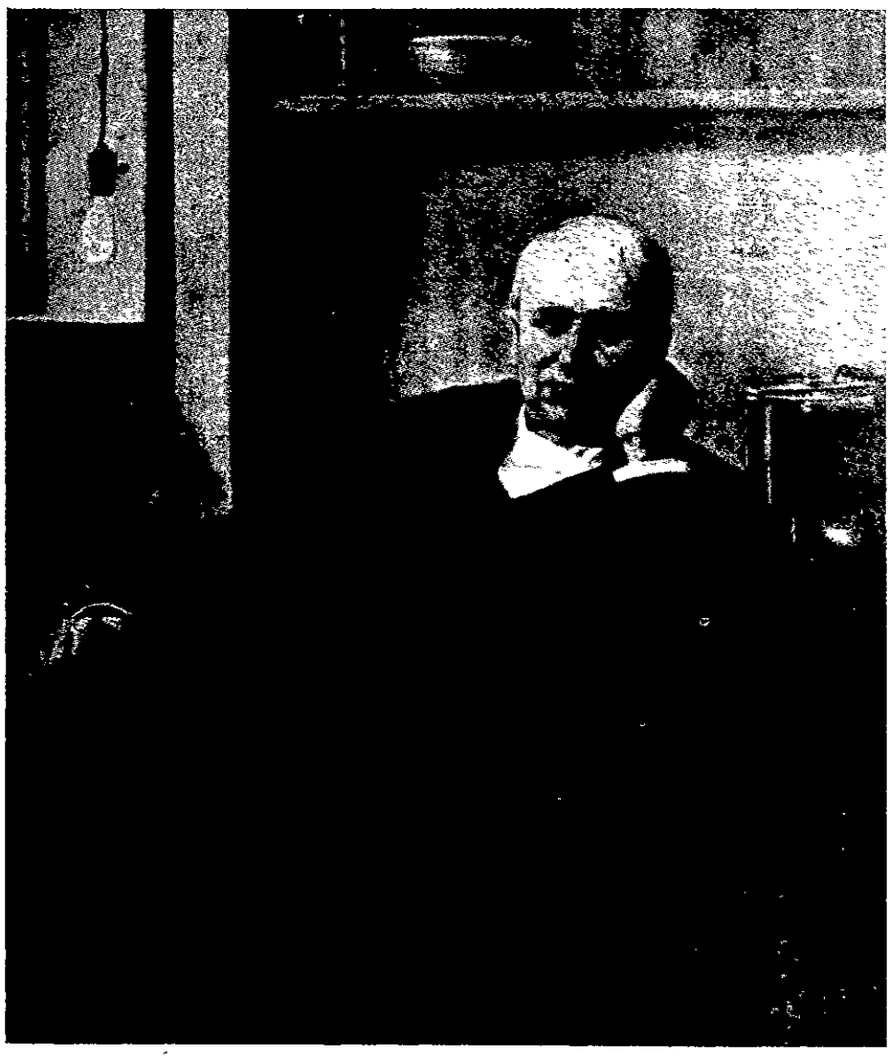
La Motosacoche.

We understand that this machine is growing in favour, as indeed it deserves, on account of its good qualities, which are lightness (it weighs only 70lbs-, speed (thirty miles an hour at a cost of one and threepence), climbing power (up to 1 in 8 without assistance), and great simplicity. It is, besides, free from jerkiness, running smoothly always, and can be handled with ease by persons of medium physique. The cost of one we know of has been worked out for running upkeep and depreciation (10 per cent.) to 2s 5½d. for 100 miles. One Wellington firm estimates that its traveller gets through a week's work in two days with one machine, and another has six of them in use.

Engineering

The Edison Storage Battery.

Last month early it was announced that this long promised storage battery was about to be practically demonstrated in London. The fact was cabled and noted in PROGRESS. Mail advices just to hand state that the new battery is for use on street car systems. The inventor is satisfied that a car will run a whole day without recharging. He has expressed the opinion that the use of the new battery would revolutionise surface car traffic. He predicts that street car lines will employ none but cars equipped with the new batteries when he has demonstrated their commercial value; the tracks will be without either overhead or underground wires, or rails for the transmission of current, and comparatively cheap stations only will be necessary where the storage batteries may be charged after they have exhausted their store of current. There is no news of the promised demonstration. If the inventor is right—and when has he been wrong?—a great revolution in tram traffic is at hand. Tram owners hard pressed to keep pace with the times should watch this closely.



LATEST PORTRAIT OF C. A. EDISON,
Whose Storage Battery is just coming into use on Tram Tracks.

Blackwell's Island Bridge.

Another Edition of Quebec.

When the Quebec bridge fell into the water, drowning so many workmen, the ability of the American engineers was quickly challenged. Professional men on the British side of the water said that they sacrificed solidity to cheapness, taking too many risks. Comparisons of various designs for bridge construction were published in the technical papers of Great Britain and America. Several representative Americans replied with ridicule of what they chose to consider the hidebound British prejudice in favour of weighty costliness. But before the end the whole weight of expert opinion on both sides of the Atlantic was against them, and the end, which was the final report of the Commission of Enquiry into the Quebec disaster, left their prestige greatly shattered.

During these discussions one particular American railway train and traffic bridge was much in evidence. This was the bridge at Blackwell's Island, over the East River, New York. In comparison with the Quebec design, this appeared to be of a strength far greater. Men repeatedly said, "If the Quebec specifications had been like those of Blackwell's Island things would have been different."

But a thoroughly alarmed profession was looking into things, and once out of the Fool's Paradise, where the spread-eaglers had lived so long, they quickly pounced on the Blackwell's Island bridge, then approaching completion. The bridge had cost between five and six millions sterling; it was the greatest cantilever structure in the world, it had the prestige of America written large all over its immense and imposing decks, traffic ways, railroad tracks, and the rest. A remorseless profession examined, checked, learned, inwardly digested, and without hesitation condemned the bridge as dangerous, insisting upon an investigation to determine the actual strength of the structure. The Bridge Department of the United States consented, and the investigation was entrusted to three men—Professor Burr, of Colombia University, and Messrs. Boller and Hodge, bridge engineers of New York—all of them possessing the confidence of the engineering profession.

While they investigated, the fears of the experts of America grew to white heat. When they reported the revelation was a catastrophe. The report meant that if the bridge, when opened, was subjected to the loads for which it was designed it must collapse, as the actual strains would in every case exceed the strains for which the bridge was designed, in one case going as high as 47 per cent. over the point of safety.

In the beginning, when the bridge was designed, the determination was to have it made strong enough to carry the greatest possible congested load that could be put upon it. This was found to be 16,000 pounds of moving weight for every lineal foot of the structure. Subsequently the Department determined to add to the capacity of the structure, by adding four elevated tracks. This involved a very large increase to the live loads, and ought to have meant also the thickening and strengthening of the general design proportionately.

Prudence, says an expert authority, would have suggested that at this point, a complete recalculation of the bridge be made, and a new strain sheet drawn up. Instead of this, the first strain sheet was accepted as correct and *pro rata* increases were made in the sections of the various numbers.

Into the new condition of the bridge the investigators went very carefully, until they were able to make, after actual weight and measurement, a strain sheet of the whole. The result is written in the pronouncement above quoted, and it has been held by good authority to spell "the most momentous case of faulty design in the whole history of the designing of long span bridges."

Of course, this was bad enough. But there was worse to come. It was found that when the maximum stress was first calculated no allowance was made for secondary stresses or for snow load. The latter omission seems amazing, in view of the fact

that sometimes a blizzard might, besides loading up the tracks and frames with enormous weights of snow, block long trains adding immensely to the load. Anyhow, the strain sheets of these investigators proved that if the bridge were subjected to the ordinary strains designed for it, the structure must certainly collapse.

The next thing to find out was what weight the bridge can carry at the very most with safety. After due investigation they found that the bridge designed originally—before the capacity was increased—for a load of 16,000 pounds was equal to a weight of no more than 6,000 pounds per lineal foot. And this smaller load the bridge can only face with safety with very careful regulation of the traffic. Thus, if there is an accident bunching cars together, the safety of the bridge will be endangered by a live load two-thirds less than it was "designed" to carry.

There is only one thing, it seems, that can be done to save the bridge traffic. The four elevated tracks must be taken off. Now the bridge was meant especially to link the heavy electric train services of Greater New York, and the six millions sterling was expended for that purpose. When the reduction is made the bridge will be good only for trollies, trucks, and foot passengers. In plain English, if the bridge is worked for the original purpose it will collapse. and if it is not. the money it cost might just as well have been thrown into the East River. As a measure of safety, and as a provision for the growth of the traffic of the future, the bridge, of which so much has been heard, and upon which such a vast sum of money has been expended, is only fit for the scrap heap.

The condemnation is sweeping and the prestige of the new school of bridge builders of the United States is hopelessly shattered.

Sighting Board Adjuster.

The very ingenious invention of Mr. C. Craig, shown in our illustrations, has been acquired by the New Zealand Government for use upon the railways. It is well known that smoothness of running of railway vehicles depends very greatly upon the evenness of the track rails. Mr. Craig, who is a practical railway man, found that the old sighting contrivance used by surface men, consisting of a straight edge supported upon a series of wooden blocks, was exceedingly inconvenient, and led to waste of time.

By Mr. Craig's invention the sighting board may be adjusted in a few moments and taken off the rails and replaced with the minimum of time and trouble.

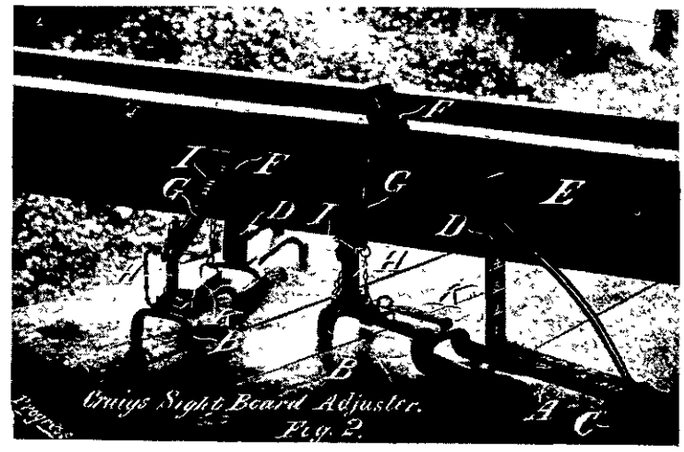
Our first illustration (Fig. 1) shows, for the purpose of comparison, the old and new methods upon the same set of rails. Our second illustration shows larger views of Mr. Craig's apparatus, one bracket being applied to the sighting board, while the other is disconnected.

It will be seen that the bracket "A" has the claws "B" and "C," which rest upon the rail. The vertical standard "D" is marked in inches as shown, and against this standard the sighting bar "E" is gripped by a swivelled grip block "F" upon the end of a rack lever "G" pivoted to the upright "E." A link "I," slidable on the rack lever, is connected by a chain with a flat spring "K." By this means the gripping block is held securely against the sighting board to prevent it from shifting when the apparatus is moved from one position to another.

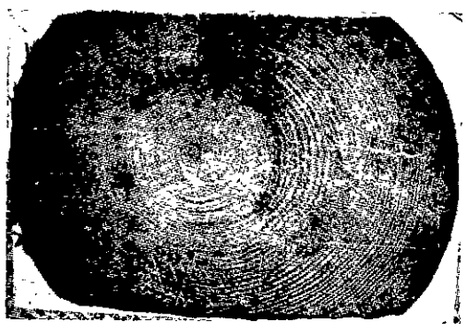
In using the apparatus two of the brackets are placed on the rails opposite to each other and the sighting board is placed against the respective standards. The rack levers are then dropped so that the gripping blocks press the sighting board against the standards and the links "I" passed into the teeth of the racks in the levers.

Craig's Sight Board Adjuster. Fig. 1.

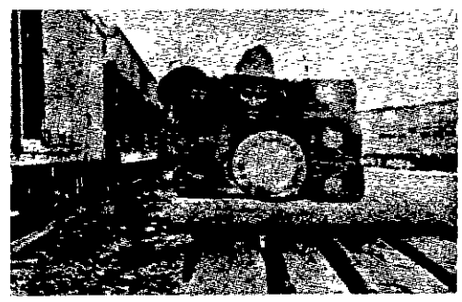
CRAIG'S ADJUSTER. Fig 1.



CRAIG'S ADJUSTER. Fig. 2.



Centre cross section of short leaf pine tie treated after Rueping Process at Somerville, Texas.



Pile of railway sleepers after the Rueping Process. The round piece in the centre absorbed only 2¼ per cent. of creosote

The Rueping Process.

Latest Thing in Timber Preservation.

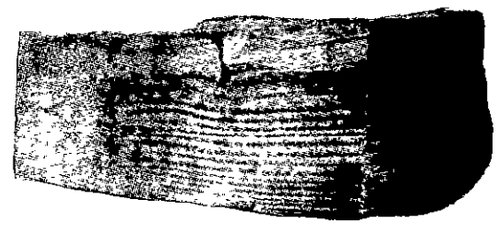
INTRODUCTION.

The value imparted to all timbers by the addition of creosote is incalculable. Without creosote only a percentage of milling timber is worth anything. With creosote added, the poorest timbers become strong and durable, with a resisting power proof against climates and insects alike, assured against the summer's sun and the winter's frost, certain never to rot before they die from natural causes.

Under the old methods the creosote was overcharged, with two results, (1) the timber was not durable, and, (2), it was sodden, heavy and expensive.

The reason it was not durable was that water getting into the pores, took away the creosote in them, and in due course, the rest of the creosote "leached" away as the timber men have it, after the first disturbance.

But it mattered little whether the timber was durable or otherwise. The second of the above results of the old process made it too costly. So much creosote was absorbed by the sodden stuff, that the cost of the process became prohibitive.



Part of longitudinal section cut from centre of Loblolly Tie after Rueping Process.

Therefore, when a new process was discovered ending this state of things, the creosote industry had been ended by the prohibitive cost of the creosoting. The remedy was very simple.

OBJECT OF THE RUEPING PROCESS.

The object of the new process, with the above name, is first to charge the timber thoroughly with creosote, or any other oil

or substance that may be desired, and, secondly, to expel all the superfluous creosote. Put another way, its object is to reduce the required quantity of creosote to economic proportions, and at the same time to improve the quality and desirableness of the timber for use.

This process is the property of C. Lembecke and Company, of New York, who do business in the States, Canada and Mexico. Their representative in New Zealand is Mr. H. Lightband, to whom we are indebted for the particulars of this new process, which has restored the creosoting of timber to the region of things practically economical.

In most timbers the heartwood cannot be permeated with any liquid preservative without destroying the fibre of the heartwood, which, of course, would be unwise to do, as the heartwood in itself has generally strong resistant power against decay. As an average, timber to be impregnated has about forty per cent. hardwood. Thus of every cubic foot six-tenths, speaking roughly, contain matter to be impregnated against decay. More than fifty per cent. of this big proportion consists of air space, leaving a balance of less than fifty per cent., say about three-tenths of a cubic foot of wood fibre to be permeated with the preservative. Three-tenths of a cubic foot has a displacement equal to about 2.25 gallons. The Rueping Process leaves in the timber on an average 4½ to 5lbs. of creosote, equal to about ½ gallon per cubic foot. It will therefore be seen that the amount of preservative left in the timber is equal to at least twenty per cent. of the wood fibre, or tissue, to be preserved. This very high percentage, it will be understood, if creosote of good quality is to be used, will be amply sufficient to lastingly preserve the timber.

The claim of the owners of the process is simple and clear. The principal object of the Rueping process is to make the impregnation of wood possible with such means of impregnation as have proved to be practically the best, but which, on account of their high price, could not up to the present time be used at all or in a very restricted manner only. Therefore the Rueping process is of very great importance to the tar-oil impregnation, because the latter used to be too expensive when carried out after the systems heretofore used.

The Rueping process is also important for the impregnation with salt solutions, because with this new process considerably less of the impregnating fluid is required. Consequently it is possible to use a more concentrated solution without increasing the cost of the impregnation. The more concentrated the salt solution, the stronger and longer lasting will be its effect. The small consumption of such solutions has, moreover, the great advantage that the wood impregnated after the Rueping process contains only a comparatively small quantity of water, in consequence of which only a short time is required for drying it, whereas with the full impregnation the wood must lie for months in order to become quite dry. For this reason very often wood is used, which is not yet sufficiently seasoned, a practice much to be deprecated, especially for railway ties. The latter, when laid on the track and imbedded in gravel, require a rather long time to become perfectly dry again, owing to the "hygroscopic" properties of most salts, especially chloride of zinc. If, however, the fibres of the wood are too long exposed to the influence of salt solutions, a slow chemical destruction of the wood will take place.

THE MODUS OPERANDI.

The impregnating works consist principally of: 1. Impregnating cylinders strong enough for a pressure of from 7-15 atmospheres equal to 105-226 lbs. 2. A tar-oil tank capable of a pressure of from 5 to 8 atmospheres, equal to 75 to 120lbs. 3. An air compressor, which at the same time may serve as a vacuum pump. 4. A pressure pump. 5. A steam boiler. The cost is according to the amount of work to be done, and at the same time dependant on the local prices for boilers and machinery.

The wood to be impregnated should be air-dry just as with the old systems of boiler-impregnation; it should therefore not contain more than about 20 per cent. of water. It can also be dried artificially, which, however, is not to be recommended on account of the additional cost thereby incurred. Of course the wood can be rafted on the way to the impregnating works.

The best material for impregnating with has been long the subject of discussion. This firm has been led by its experiments to prefer creosote and discard all salt solutions.

RESULTS OF THE PROCESS.

In the United States of America ten million sleepers are used every year, all creosoted by the Rueping process. That is a solid fact in corroboration of this company's claims.

Professor Tubeuf, of New York, easily recognised as the scientific authority on timber, thus reports a searching test of the behaviour of this timber in presence of the domestic fungus:—

"The boards impregnated after the Rueping process were put between boards infected by the domestic fungus, after they and all other wood in the cellar had been several times freely sprinkled with water. While wood not impregnated was destroyed in such a manner that it could be crushed to dust by the hand, the Rueping boards remained in the cellar for two years, exposed continuously to the infection of the fungi prolifically sprouting and growing all around them without thereby having been infected. The fungusmycel did not even grow on the surface of the Rueping boards, so that the boards after two years are exactly as intact as they were before the commencement of the test. It even appears that the exhalation of the creosote alone is injurious to the fungus and repulses its growth. If the domestic fungus does not attack such boards, it is much less to be supposed that any other wood-destroying fungi will do so."

There is, moreover, the important fact that on certain railways in France, within a period of 21 years, only 6 per cent. out of all the beechwood railway ties, which had been impregnated with tar-oil, had to be exchanged. This is because instead of being gradually washed out of the wood by rain, tar-oil of proper quality, in the course of time becomes more and more solidified and covers the cell walls with a coating quite impervious to water and rain. By this means the solidity of the wood will gradually be increased and the mechanical wear considerably diminished.

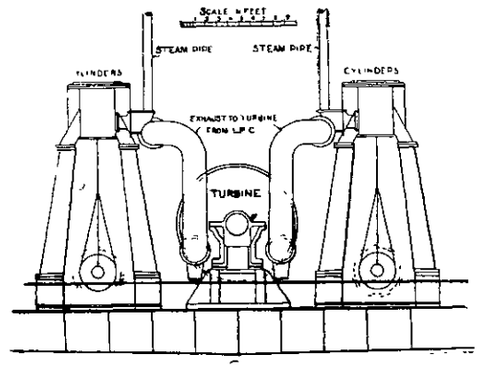
The case for creosote and the Rueping process is remarkably good.

The S.S. "Otaki."

A Promising Experiment.

Our illustrations show the arrangement of the machinery in the engine room of the s.s. "Otaki," the New Zealand Shipping Co.'s great cargo carrier, which reached Auckland, from London, in January. This is her maiden voyage, and the fact is of especial interest because the "Otaki" is somewhat of an experiment, being the first ship in the world to be fitted with engines combining the reciprocating and the turbine principles.

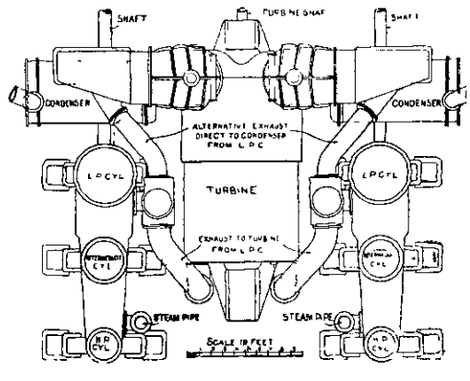
In addition to twin-screw triple expansion reciprocating engines made by Messrs Denny, of Dumbarton, and having cylinders of 24½in., 39in., and 58in. by 39in. stroke, she has a low pressure turbine of the Parsons' type located between the reciprocating engines, and operated by the exhaust from the low pressure cylinders.



RECIPROCATING ENGINES AND TURBINE, S.S. "OTAKI."

The experiment has succeeded, and the erecting engineer (Mr. Evans) who is acting as Chief Engineer of the "Otaki" during her maiden voyage, expressed his complete satisfaction with the result. "I am perfectly convinced that this combination is going to be a big success," he says. "There is a big future before it."

To drive the "Otaki's" turbine, steam is utilised, which in ordinary reciprocating engines leaves the low pressure cylinder and



GROUND PLAN OF ENGINES AND TURBINE.

goes direct to the condenser. In the "Otaki" this exhaust passes through the turbine on its way to the condenser, thus effecting a great saving of power. In the case of ordinary engines the exhaust from the low pressure cylinder is somewhere between 5 and 8lbs. above atmospheric pressure. In the "Otaki," in order to take advantage of this low pressure, the blades of the turbine are very large, ranging, in five grades, from 4¾in. to 13in. in length. The diameter of the rotor is 7ft. 6in., and it makes from 160 to 180 revolutions per minute under ordinary sea-going conditions.

During the voyage out, the turbine averaged 160 revolutions per minute.

There are several novel features in the construction of the turbine, but precise information concerning them is not at present to be made public. Our drawings are, however, drawn to scale, and are interesting as showing very clearly the general arrangement of the engine room.

The other machinery with which the new steamer is fitted is also most up-to-date, one of the main features being a "contra flow" condenser invented by Mr. Morrison, well known in connection with Morrisons' furnace. In this condenser there are three sets of tubes in three separate compartments, and the steam flows from one compartment to another, and comes in contact with each set of tubes in succession, the water being withdrawn from the bottom of each compartment.

The object of the invention is to allow the water of condensation to be immediately withdrawn from the condenser instead of as hitherto falling from one tube to the other and remaining for some time in the apparatus, thereby impairing the cooling surface of the tubes and reducing the effect of the condenser. With this new condenser, with the barometer at 30, the very high vacuum of 29½ inches is obtained, which shows what a very effective apparatus it is.

A refrigerating plant fitted by Messrs. Haslam, has all the latest improvements in the brine and dry air systems.

The "Otaki" is 464 feet long, 60 feet beam, and on her trials, with 5,000 tons of cargo, she averaged 15.2 knots, a big speed for a cargo carrier.

Panama Canal.

Since the American Government took charge and substituted officers of the scientific branch of the military service for the civilians the work has made very great progress. The rate is apparently permanent, for the reports are now regularly signed by the same officer, Colonel Goethals, who is both chief engineer of the works and chairman of the Canal Commission. Throughout the States they are commenting on this fact, and on the statement of the chairman that for the first time in the history of the Canal the personnel of the staff has remained unaltered a whole year. One can judge from this contrast between the old and the new how nearly the canal project came to grief before the Government took hold of it. Stability of administration is thus no longer one of the crucial difficulties of the venture.

Unhappily there are still difficulties, and there is in sight no way clear through them as yet. It is gratifying to find, however, that the works are being conducted with energy and efficiency. That is attested by the progress achieved. There are now, in addition to a fleet of dredgers, over 100 steam shovels at work, shovels which range from 45 tons to 95 tons in weight. The total quantity of material removed, rock and soft, dredged and excavated, exceeded 28 million cubic yards in the 12 months. Of this quantity, about 12 million cubic yards were removed from the Culebra division—that is to say, from the great "divide" in which the mass of the excavation lies.

Now the Canal has cost the American management a good deal of money. The French company got eight millions for the property, plant and goodwill. Since then, the project has cost fourteen millions and a half, apportioned as follows:—

Works and engineering ..	£5,600,000
Plant	6,000,000
Municipal Improvements..	1,120,000
Sanitation	1,340,000
Administration	500,000
	£14,560,000

The report does not continue longer in this work of chronicling pleasant things. The figures out of the way, we read that the old difficulty of the land slides has got to the front again. The *Times* condensation says:—"Some difficulty has been experienced from land slides on the easterly side of the canal. The old slip at Cucaracha, which gave the French engineers so much trouble, as well as its smaller fellow at Paraiso, have both moved forward again, while two smaller slides have developed in the upper level of the Culebra cut. It is easy to make too much of these occurrences; they are but part of the Nemesis which invariably overtakes interference on any large scale with Nature's methods, and bear no serious proportion to the importance of the undertaking. The slides are mainly in the rotten red clay which overlies the harder material, and it may be a question for the consideration of Colonel Goethals and his coadjutors whether a bolder policy in dealing with this treacherous material will not eventually prove to be the more economical and advantageous."

The friendly commentator has given the number of these slides, which is larger, unfortunately, than it was in the time of the French; he has named their colour, he has described them as the inevitable Nemesis which overtakes those who interfere with the ways of Nature; but all these particulars only suffice to broaden the appearance of disaster, and the call upon the engineer to take to some bolder but not described policy does not tend to mend matters in the least. There is, however, worse to come. The report, as condensed, continues:—"The first serious attempt to construct the dams, which form so salient a feature in the scheme which is being carried out, ended unfortunately. The seaward group of locks on the Pacific side was to be built at La Boca, at which place the actual tipping of material from Culebra was begun during the year, with the result that dam construction was found to be impracticable on the chosen site, that it consequently became necessary to abandon the whole of the work, preparatory and otherwise, which had been executed at the place, to change the general plan of the undertaking, and to find what is hoped will prove to be a more suitable site three miles further inland, at Miraflores.

"Notwithstanding the very extensive investigation which had been made at the *locale* of the great dam at Gatun, further borings have revealed such a condition of things in the underlying strata that it has been determined, notwithstanding the optimistic opinion of the engineers who originally fixed upon this site for the dam, to drive a row of triple sheet piling across the valley of the Chagres in which the dam is to be formed. Engineering opinion both in the States and in Europe will undoubtedly support the Commission in respect of this prudent addition to the plan, notwithstanding the corresponding addition to the cost of the work which the change will entail."

There are several other deeply interesting engineering points in the report and appendices. Amongst these it should be observed that, in deference to the opinion of the General Board of the United States Navy, who considered the size of the intended locks (1000ft. long and 100ft. wide), to be "insufficient for probable ships of future construction," the width of the locks throughout has been increased to 110ft.

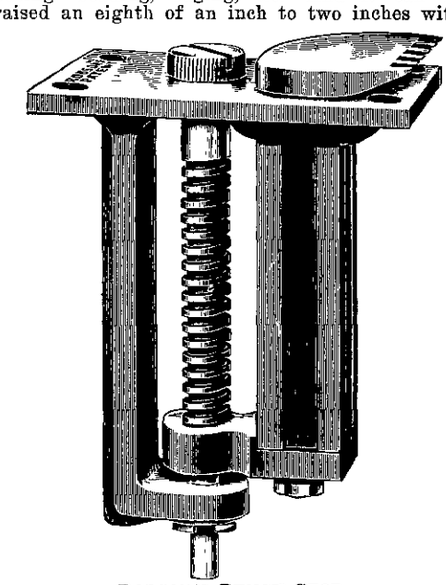
The average number of men employed throughout the year was over 43,000, about 12,000 of these being whites.

Now, here are two serious errors of engineering judgment. One of these has led to the abandonment of the Pacific locks, leaving only a hope that another and more suitable site may be found somewhere else; while the other throws great doubts on the stability of the foundation selected for the great Gatun dam, one of the largest works of this kind ever attempted by the engineer, and the very pivot of the work. All engineers will, of course, approve of the alterations of plan made in consequence, but none of them will be ready to declare that the change will be sufficient under the extreme difficulties of the work. As if this is not enough, the condensation hints at "several other deeply interesting points" which most people may be inclined to suspect owe their interest to the extreme difficulty of the engineering problem they represent. Be that as it may, there is enough in this last report to make one feel certain that if the Panama Canal is ever finished, it will cost far more money than the original estimate.

Unbreakable Bench Stop.

(Photo lent by Mr. Robson, Somerset Avenue, Wellington.)

A very taking invention is Mr. Robson's malleable iron and steel bench stop, styled the "unbreakable." It will be found certainly a great improvement on the old stop for side rebating, beading, edging, &c. And it can be raised an eighth of an inch to two inches with



ROBSON'S BENCH STOP.

a few turns of the screwdriver or fingers. Sink the plate about five-sixteenths below flush of the bench stop, so as to bring the stop-head level with the top of the bench; fit neatly down the front of the shaft; chamfer away at back and sides. The inventor appeals to joiners, carpenters, wheelwrights, coachbuildres, coopers, boatbuilders, and has a large collection of testimonials to support him. The stop is also a cramp on the left hand turn.

Stained Glass in New Zealand.

Leadlights, etc.

Photos supplied by R. E. Tingey & Co., Wellington.

Storied windows richly dight
Casting a dim religious light.

As readers of PROGRESS are well aware, there are several establishments in the Dominion where the stained glass industry is in full swing. The work is done therein in a manner very creditable to the skill and enterprise of those concerned, and the industry has a good future before it.

The other day PROGRESS paid a visit to one of these homes of industry. The obliging experts showed us the glass of their fashions and the mould of their forms. We were privileged to behold workers at work on the paper on which they draw the designs that are the beginning of their processes, and to gaze with pleasure on the finished product after the furnace has given up its artistically burnt.

Here was something to be thankful for, something on which to dream of the future, something that seemed to promise value to the Kaolin of the North and the keramic clays of the South, something that actuated one to prophecy of great workshops and vast ateliers, in the fine manner of the famous geologist of the pioneer Dominion days (von Haast), who, coming upon a lump of bituminous coal in the Valley of the Grey, sat him down to contemplate and describe the coalpits of the future, with their poppet heads rising into the atmosphere, the cities under their smoky canopies dotting the valley, the harbours with their fleets, the struggles of capital and labour struggling for the mastery, and the farms ministering to the needs of the great new industry.

But we must leave our Potsdams and Staffordshires of the future and get back to the Mother Earth of the present, that portion of the same known in the city of Wellington as Luke's Lane. This is the thoroughfare in which is situated the glass establishment of Messrs. R. and E. Tingey and Company, Limited, of which the presiding artistic head is Mr. A. R. Cattanach, whose work is well known in the Wellington Technical School, where he is a very popular and industrious Instructor. Under the guidance of this gentleman we saw the two types of process here in vogue. The simpler one is a species of plain Mosaic work, in which the design is cut out in panels of coloured glass, each coloured panel set in a lead frame, the whole fastened in a frame and known as the leadlight of commerce. The other process is more complicated, requiring the help of a kiln, which, by the way, is one of the most remarkable contrivances in the world.

For the first, the lead is melted in the ordinary way and cast roughly into a long bar with two grooves, running its entire length. This bar, known to the trade as a "calm," is drawn out in a vice to four times its length, and the grooves are deeply milled to hold the glass panels. The "calm" is then bent by the hand of the artist to any shape required by the design and the glass fitted in to the grooves. The lead is soldered in place, and there you have your leadlight. In work requiring extra strength the "calm" is strengthened by lengths of light steel, flexible enough for the bending, and strong enough for anything. These strengthened "calms" are imported. The rest are made on the premises.

In the studio there are many things to attract attention—easels of glass, frames of glasses and porcelains, designs for plaques, panels, mosaics, leadlights and memorial windows, all prominent on the walls, which they adorn in fine style. But the most prominent of all, that which catches the eye first and holds it, is the kiln. It is of the type known as the Heaton "Deflexem," and is a box of fireclay divided into two chambers, an upper and a lower, the latter with double side walls. Flame is supplied by four gas jets on each side with Bunsen burners, and the whole is mounted on long legs of steel, known as the "pedestal." This is fitted with racks, for the trays which carry the work in and out of the furnace. The lower of the two divisions of the kiln is the fire box, in which the burning is done, and it has a heat capacity up to 2000 degrees F. The flames from the burners strike on the arched roof of this chamber, and are deflected so that the heat strikes down on the work resting on its tray beneath. The flames then pass upwards through the double walls of the upper chamber—known as the annealing chamber, and find their way out through the flue pipe in the roof of that chamber. The limit of heat of the annealing chamber is 400 to 600 degrees F. A pressure gauge at the side is a guide to the heat required for each particular process.

The trays which take the work into the furnace are of asbestos and light steel, carrying a thickness of powdered plaster of Paris for the work to rest on without disturbance to its level. Sliding into grooves at the sides of the chamber they stand one over the other in tiers during the burning. The work is "warmed up" in the annealing chamber, where it is subjected to the lower degrees of heat, and once brought up to the temperature there prevailing, it is transferred to the firebox, where the flames play upon its surface for the necessary time. The burning over, the trays go back into the annealing chamber, where they are cooled off gradually. Where the painting to be burnt on is of many shades, more than one burning is necessary, as it has been found in practice that the paint, when too thick for the operation, bubbles about and the work is utterly spoilt. This disaster is known to the trade as "frying." Therefore, the colour is burnt in in relays, known as "Mats," one on top of the other.

For a memorial stained glass window the process begins with the design drawn and coloured. Then a full sized cartoon is drawn, from which is traced the "cutline," which is used as a guide for cutting the incidental glass. This is then cut into pieces according to the position of the "calms." When the pieces are cut out in glass they are put together on a glass easel and painted, according to the design. When the "mat" has been applied, the whole is again taken to pieces, and the pieces are loaded up on trays and taken to the kiln to go through the process above described. After the burning the colours are warranted to remain fresh for all time, and of course are part of the glass to which they have been applied. The burning done, the panels are fitted to the "calms" and soldered. The "calms" are cemented and painted, and the work is done.

Mosaics are also treated here, as are panels, friezes, plaques, and these may be done whole. Porcelains, tiles, and Majolica ware are also treated. The pigments are oxides—gold, copper, chromium, uranium, cobalt and the rest. The gold gives the rich purples and violets that are so expensive.

The last thing we notice are the racks of glass. They hold glass of all kinds, plain and crinkled (the kind which gives such splendid effects of light), the glass known as English Antique, the opalescent varieties, the Old Norman, such as one sees in the old lance headed windows of the Norman architects, in fact, all the glasses known to the old world of artists in stained glass. They are the groundwork of a great industry.

STUDIO, SHOWING DESIGNS AND APPLIANCES.

STUDIO, SHOWING KILN FOR STAINED GLASS WORK.

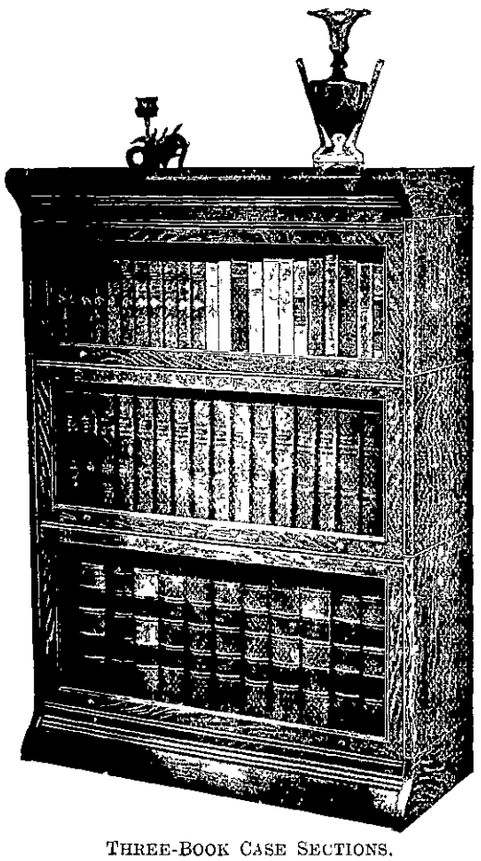
Modern Office Appliances.

Photographs kindly supplied by the Office Appliance Company, Lower Cuba Street, Wellington.

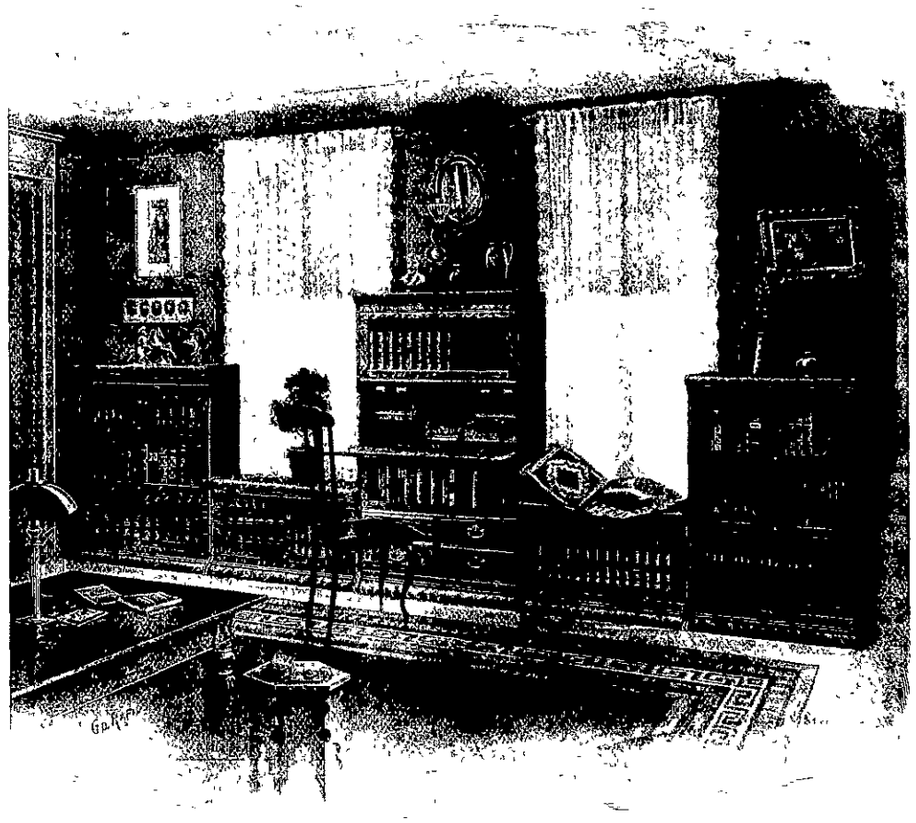
If this article reads like an advertisment of America, those amazing Americans must be blamed. It is meant to be merely descriptive.

The times move rapidly. It is not very long ago since, in British ears, the word "American" was the accepted synonym of gymcrackery and claptrap. We begin to know better now. America is Britain's equal in many industries, and in some America positively leads. She leads, for instance, in the manufacture of agricultural machinery; she leads in dentistry; she leads the boot trade. These things, despite occasional cavillers, are generally conceded. America, in short, is a country of vast resources and remarkable natural advantages in some directions. Her business men, harrassed by trusts or controlling trusts, have been spurred by competition on a mighty scale. The keenest minds of a great continent that has honourably exalted commerce and trade have concentrated their energies from a thousand different points on one absorbing problem: How shall America get the lead and keep it? That problem is still in process of being worked out; but here and there along the line, America already leads.

It is probable that she leads most notably in the matter of office appliances. In most other matters, she has simply carried on where others have pioneered; but in this matter of office appliances, she has originated. She has shown how factories and offices can be equipped, for the saving of labour and the minimising of irritation and uncertainty, as they never were equipped before she took hold. She has made office furniture more beautiful and more durable than office furniture was ever made before. And in the great matter of convenience, she has already surpassed the fondest dreams of twenty years ago. Making a new departure, she has for once virtually created a monopoly by sheer force of merit.



THREE-BOOK CASE SECTIONS.



INTERIOR, SHOWING ARRANGEMENT OF BOOKCASES.

At the outset, however, certain things were immensely in her favour. The finer British timbers were becoming comparatively scarce and costly; but America had an almost inexhaustible supply of beautiful wood preeminently fitted for this purpose—the wood we know as American oak. But she was not content with that. Having found her timber, she proceeded to build up and extend its natural capacities. She speedily discovered that the driest timber, nature dried, was not dry enough for the most exact uses. So she experimented busily, and in the end perfected a system of kiln-drying. She found that heavy furniture made in the old way, however well-seasoned the timber, had inevitable defects that the years made manifest. The most solid oak warped in time, the most faithful work failed in permanence; joints gaped or bulged as time and temperature operated on them. So that American office furniture, albeit in effect the most solid in the world, is not solid in quite the old sense. It is built in layers and cross sections so adjusted that warping is impossible; so that every pull of time and temperature produced a redeeming pull of readjustment. To-day American office furniture of the best type has this distinction: it wears true.

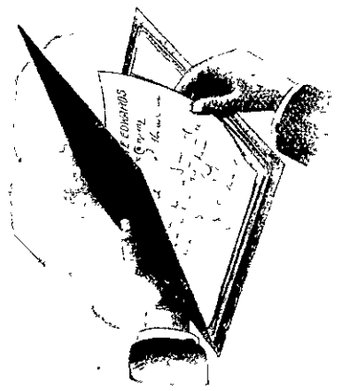
These facts were forcibly brought home to the mind of a member of PROGRESS staff by a recent visit he paid to the showrooms of the Office Appliance Company, which some time ago took over and extended the business theretofore carried on by Messrs. Yerex, Barker and Findlay, in Lower Cuba Street, Wellington. To any man who takes an interest in such things, a visit to these showrooms is a sort of education.

Let us summarise the impression and justify statement with facts. American oak is on all sides, and American oak has a beautiful grain and is highly decorative in effect.

REVOLVING OFFICE CHAIR.

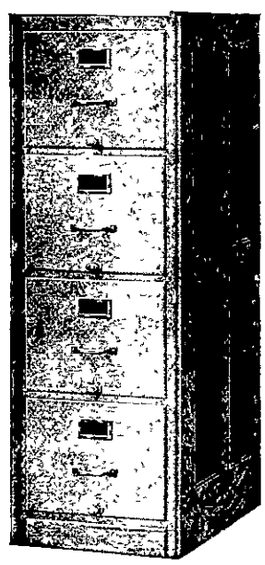
Take first the matter of bookcases. Under the old order, your booklover filled the case he happened to possess, and then acquired another; or when, in the other case, he filled his open shelves, new shelves

were added. And so the process went on, until many small libraries had such a look of disquieting heterogeneity as you may observe in a second-hand shop. The effect



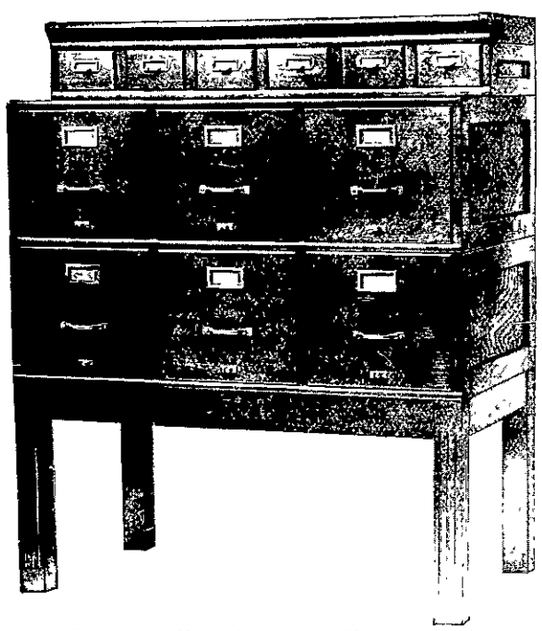
VERTICAL FILE HOLDER.

might occasionally be picturesque, but it was not satisfactory to the earnest reader, and it was (this being a matter of more importance) excessively wasteful of space. Many of the old book-cases, and all the old shelves, were open, so that the books were



FOUR DRAWER VERTICAL FILE

exposed to the dust that disfigures, the fly that corrupts, and the moth that destroys precious bindings. Between loved pages flies were often enough entombed. When bookcases were enclosed, they generally had



VERTICAL FILE ARRANGED NUMERICALLY.

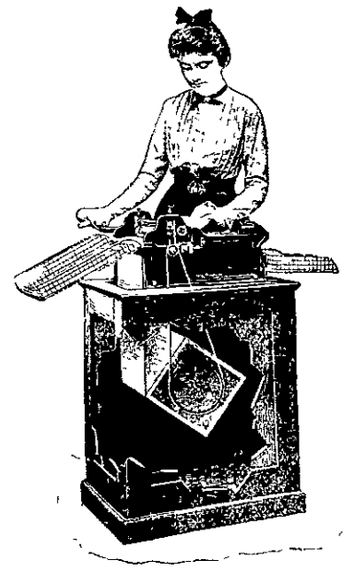
ungainly doors that swung outwards; and at the end of each shelf there were small hidden spaces in which books hurriedly needed had a habit of hiding themselves.

These amazing Americans have improved on that. Their bookcases are sectional. As a man's books increase in number, he adds section after section to his case. He can get sections of almost every conceivable shape—sections that will serve as window-seats, escritoire sections, sections with shaped ends to fit in corners of any angle, special sections to go round corners. The sections fit together perfectly, but each section is complete in itself, every book is fully visible, and each has a dust-proof glazed front that slips back as required, and lies snugly hidden away on the top of the section. This system of sectional bookcases is not only convenient and economical—a man need not waste an inch of his wall space—it is also beautiful. Books are the loveliest adornment of a quiet room, and by this sectional system books are shown to excellent advantage and perfectly preserved. The glazed fronts or doors slide noiselessly on roller-bearings, and cannot stick or clog.

Further, the sectional system is adaptable. It is as useful in offices as it is convenient in libraries. The sections may be used effectively as small show-cases. They serve admirably for the keeping of catalogues. They may be put to almost any use that convenience may require or ingenuity devise. For libraries, the escritoire section is compact and invaluable, and provision can be made among the sections for the keeping of the style of card-catalogue now adopted by every well-regulated library in the world. It is a sign indicative of these rapidly changing times that in the library of the Vatican at Rome there is an American card catalogue.

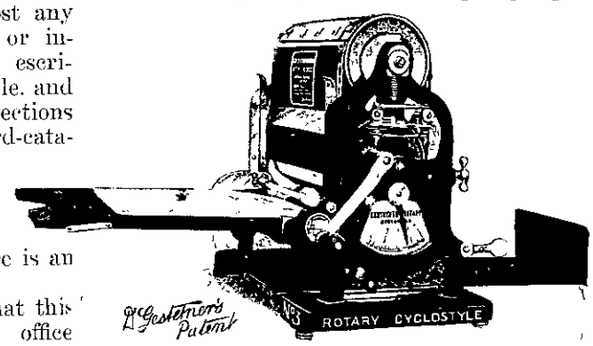
After all, it is to business men that this marvellous perfection of American office furniture chiefly appeals. Some facts are easily overlooked. Your business man in the average spends at least a third of his life in his office. His clerks, secretaries, accountants, typists, or other paid servants, spend a third of their lives in office also. In proportion as friction and irritation are reduced, in proportion as comfort is secured and convenience perfected, so is this big span of the business life lived well or ill. Millions of business men of the older type are fastidiously careful of comfort at home, and most extraordinarily careless of comfort in office.. But if you take out of the reckoning the time spent in sleep, the average business man spends a very small part of his life at home. There is no reason why, having provided for the comfort of his women folk and progeny, he should not reasonably consider himself. That is why the new type of business man, having taken thought, is beginning to realise the virtue of making office comfortable.

Take chairs. The old, high, hard-seated, backless stools of English offices were abominally back-breaking and disheartening things to spend the day on. The new office chair of the Americans is as comfortable in its degree as a saddle-bag. The typists' chairs are wonderfully well adapted for their purpose. Typewriting from an ordinary chair is a wearisome business. As the typist necessarily leans forward, the ordinary chair-back gives no support. In the American typist's chair, the back is sensitive and adjustable. It moves with the typist, and gives excellent support. The



Y & E RAPID ROLLER COPIER

pressure or tension of the back support can be regulated to a nicety. The seat can be raised to any height required, and when that height is fixed the chair can be swung round to any extent without affecting it. The seats neither weary the body nor wear-out the clothing. Never before was such delicate complexity of invisible springs ap-

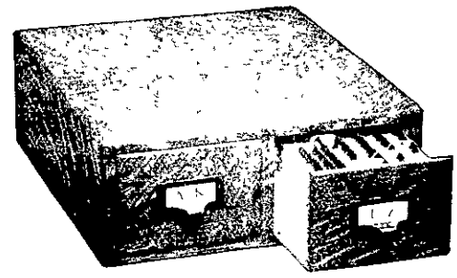


GESTETNER'S ROTARY CYCLOSTYLE.

plied to furniture building; and yet the simplicity of the mechanism is such that under fair treatment it can seldom or never get out of order.

Such details, concerning office furniture, may seem at a first glance trivial. They are not. Physical discomfort does not conduce to mental clarity; bad conditions of work do not make for good temper. The new type of business man realises that the better the conditions under which his employees work, the more fully and consistently will he profit by their skill.

It is really very difficult to say how far these benefits will go. Once this new

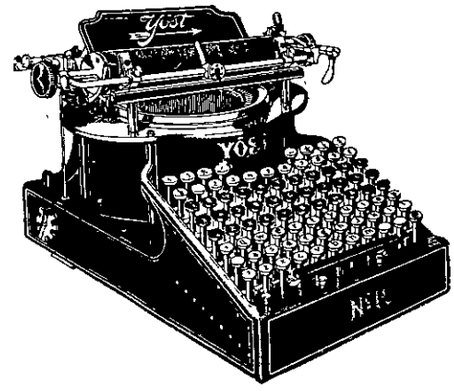


TWO DRAWER CARD CABINET

principle was adopted, it grew like a river, as tributary appliances were perfected. The improvement in filing devices has been especially remarkable. All of us have experienced the defects of the old system. There were files, roughly labelled, that

THE UNDERWOOD VISIBLE TYPEWRITER.

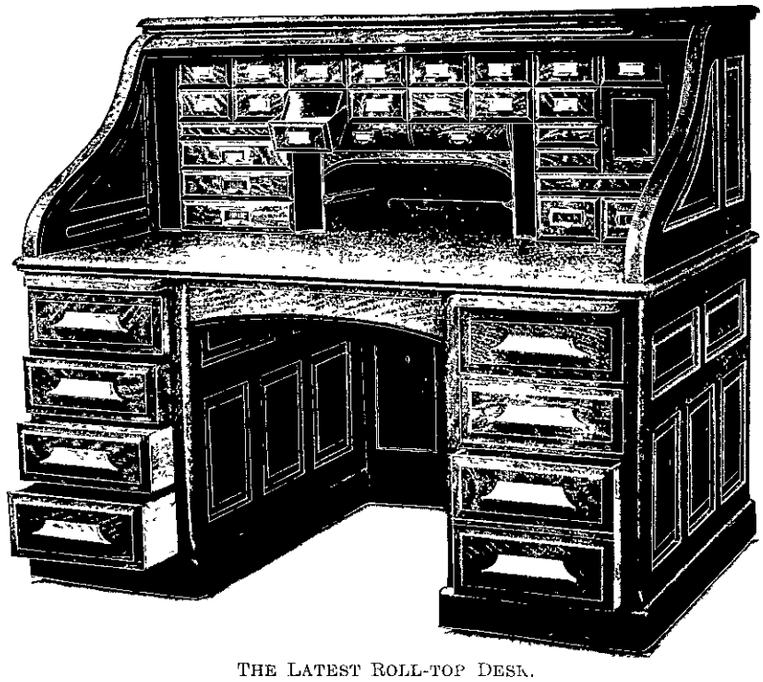
THE PORTLAND SUN (VISIBLE).



THE LIGHT RUNNING "YOST."

hung round the office on nails. These files were unlovely. They were easily mixed. They gathered the dust. And, more than all, they were inconvenient in use. That also the Americans have changed. To start with, they introduced a system of filing alphabetically in flat trays, each tray fitting into its place in a cabinet. That was a good system, so far as it went; but it did not prove good enough for the busy men who had learned the advantage of doing things thoroughly. They wanted, not a good thing, but the best. The system of vertical filing marks a great advance, and its possibilities are almost endless. It reduces labour, it lowers the risk of mistake to a minimum. In the vertical files, each folder contains letters or papers dealing with a given subject; and each number and subject is indexed by reference and cross-reference in the card catalogue that forms part of the system. By this means, a letter months or years old, dealing with any subject, is as readily at hand as a letter that came and was answered yesterday, and all the answers are filed exactly in their place and order. Where the most ordinary care is used, there can be no confusion. It is easier to pick out a number from the vertical-file folders than it is to turn to a given page in a book. The folders are filed upright in a drawer of fitting size, every number showing. Subjects or general classification are marked by heavy guide-cards, each with its projecting tab. This system of vertical-files has been adopted by many New Zealand firms and it is easy to accept the Company's assurance that there is no case on record in which the system has not given satisfaction.

In especial, the old bugbear of confused stock records is removed. The card system for stock records provides a sort of automatic perpetual inventory. Receipts, deliveries and stock-balances are shown on a single card. There can be easily added (1) goods to arrive, with name of boat, (2) goods on order for which documents have not yet been received, and (3) goods ordered by mail, but which have not yet been shipped. The system also makes provision for postcards, which have proved invaluable in practice.

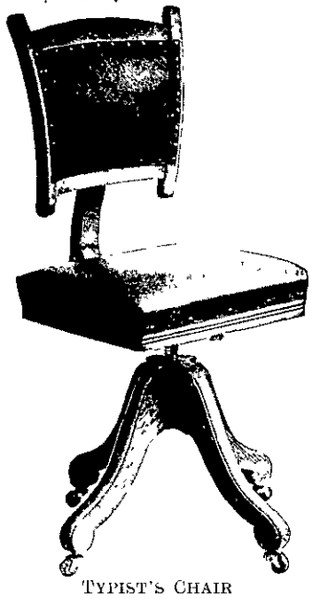


THE LATEST ROLL-TOP DESK.

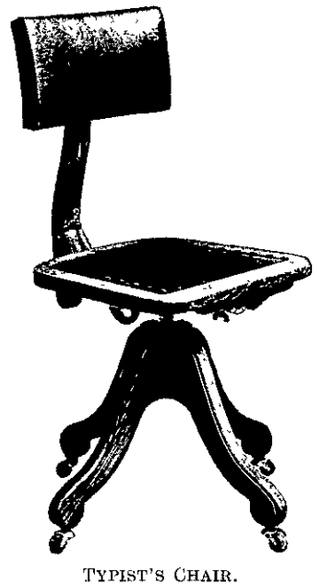
An extraordinary feature of this system is the ease with which it can be adapted to the needs of any business. It is being used all over the world, in tens of thousands of cases, by all sorts of firms. Every business man who needs a precise record of any sort—from an ironfounder to a dentist, from a beauty specialist to a wholesale butcher—finds his purpose served. It is a system of universal applicability.

The modern principle has been gradually extended to cover all office appliances. Thus the latest roll top desks (there are many in this showroom) are marvels of convenience. There are drawers for vertical filing, drawers for flat filing, pigeon-holes with collapsible fronts. There is a compact card catalogue specially adapted for this requirement, by which the business man can keep an absolute check and tally of all his appointments, intentions and fixtures, for months ahead. There is everything, in short, that can minimise the labour of the busy man who knows the value of time and the dangers of confusion.

Even the old-time copying press has to go. The new Y. and E. Rapid Roller Copier does the work in a tenth of the time, and does it more effectively. Letter after letter is copied, and the copy dries quickly and is ready for filing. Under the old



TYPIST'S CHAIR



TYPIST'S CHAIR.

system, only one copy of a letter can be taken; with the Rapid Roller Copier it is perfectly easy to get half-a-dozen copies. But for the man who wishes to send out hundreds or thousands of signed letters to advertise his business—and the man who does not know the value of signed letters, as distinct from printed circulars, is still a neophyte in trade—there is the Gestetner Rotary Cyclostyle. The original letter is typed on a prepared sheet, and the prepared sheet is fitted to the cyclostyle. Then a handle is turned, and the machine, automatically fed with the blanks, turns out sixty copies a minute, each copy an exact replica of the original. The keenest expert of typewriting cannot distinguish between an original typed letter and a cyclostyle copy.

Near at hand are the new typists' desks models of convenience. The machine is screwed to its bed, and the moment the typist finishes work, the machine rolls over into a recess, the lid closes, the key is turned, and everything is secure for the night.

Of course the Company sells typewriters. The present writer knows something of these ubiquitous machines. He has used typewriters of one sort and another in all sorts of climates, under prety well all sorts of conditions. So, because he has been for so long accustomed to "invisible" machines, he does not care whether a machine writes visibly or not, and he is not prepared to enter upon any comparison of the excellent "Yost" with the admirable "Underwood," for instance. But there is one new machine in the Office Appliance Company's showroom that appealed to him. The "Sun" is a small machine, and can be carried in its comely leather case as conveniently as a handbag. But, unlike most small machines it is solid and sturdy and strong. It is of extreme simplicity in movement, it gives perfect alignment, and it can be worked at a high speed. For the purposes of a man who keeps a typewriting machine merely for for his personal convenience or his private correspondence, the "Sun" appears to be excellent. It has none of the essential delicacy of some of the big, much-advertised machines. There is nothing about it that will get out of order with fair treatment. There is no ribbon to go wrong and need attention. It would be a very easy machine to learn for touch-typing.

And so one might go on almost indefinitely, for of the many inventions exhibited in this showroom there seems to be none of dubious value, and none lacking points of special interest and appeal. The Americans have their faults, and it may be that they have formed the injudicious habit of carrying their faults in front. But they are a great people, and they have abandoned some things in office appliances that other nations have scarcely yet discovered.

All the same, there is an American catalogue in the library of the Vatican. And the more you think of that, the more singular and illuminating it must seem

Fifty-six foreign countries have representatives in London.

A French engineer, M. Edouard Cros, has submitted to the French railway companies an invention designed to relieve drowsy travellers of the fear of being carried past their destination The invention consists of a slip of paper on which is a dial.The passenger writes his destination on the slip, marks the time he is due on the dial, and attaches the paper to a part of the carriage where it can be easily seen by the railway servants, whose duty it will be to tell the traveller when he has arrived.

Miscellaneous

Socialism.

(By Peter Ellis.)

A millennium to some, a nightmare to others, Socialism is in the air, but if by Socialism we mean the distinction of the vital principle of competition, it spells failure, for whether we like it or not, competition is the basic principle of existence, which none but the Creator can change. The elements compete, and we have life; and no fact is more self-evident, if we look for it, than that competition, or the warring of the elements, gives birth to being, and but for this mysterious and paradoxical operation everything would be involved in a onesided chaos. Nothing is so thin as to have but one side, opposition and competition lie at the foundation of all things. True Socialism cannot be an exception; it must allow a community of differences, different minds, different aims, different status, a living series of levels, not a uniform dead one; there must be room upward for the forest giant, while scrubby trailing plants flourish below. Nature is built that way, and society must follow suit, or fall into ruin. To stultify the element of healthy rivalry in social life is to dwarf its magnificence. The essence of true socialism is in a combination of the opposing elements of co-operation and competition, which is no more a paradox than that everything solid has opposite sides. A stable Parliament must include a strong opposition, too much one-sidedness is lopsidedness, with a centre of gravity tending towards instability. In law, in science, in art, in everything pertaining to this mundane existence, the unerring principle of opposition applies. Why, then, ignore it in social life? Let us accept human nature as it is and not as we would have it. It embraces selfishness and unselfishness, two opposites; take away either, and the whole fabric falls to pieces. Mysterious as it appears, it is in the regulation and due proportion of these opposing elements that true progress obtains. Facts are "stubborn things," but facts remain, in spite of specious arguments. What, then, is the ideal socialism? Plainly a brotherhood of inequality with a due regard for merit, an encouragement of thrift, a healthy competition working together in a happy combination to secure the elevation of humanity, a discouragement of idleness, status above status, according to the vigor, the industry, the ability of the individual (society must necessarily consist of individuals); any attempt to climb by unworthy means must be condemned, and all attempts to excel by true merit rewarded. Then, and only then, can we have an ideal socialism, a series of living steps, one above the other, leading upward and onward. This ideal may be unattainable *in perfection*, but we may shape our course thitherward and escape many of the pitfalls whereby rogues are banquetted and honest men go hungry. Jack may be as good as his master, though their status may be widely different. A human family may work amicably together, though its members range from philosophers to fools throughout the whole gamut of kinship.

Earthquakes.

Of the earthquake fact there is no doubt of any kind. It shakes you and everything in which you are interested. Sometimes there is a mere tremor with a light scare like a catch in the breath. Sometimes cities are devastated and men crushed to death by the thousand; and occasionally districts are engulphed by the sea. But scare or terror, disturbance or death, the earthquake is unmistakeable.

Of the causes of the earthquake there is much discussion. Science wanders among many explanations. Once upon a time all scientific men regarded earthquakes as due to volcanic action, and it is a fact as undoubted as the earthquake itself that where there are volcanoes there are earthquakes. It seems to many, therefore, safe to conclude that many earthquakes are due to volcanic action.

At the same time the earth has certainly quaked in places where nothing is known of volcanic action. This fact has led to the evolution of the pressure theory. According to this, the weight of various parts of the earth's crust is changing. Denudation deprives the mountains of great weights, which are piled up on the sea bottom or other convenient place, until the weight crushes the supporting rocks below, when there is subsidence and cracking of the surface, otherwise earthquakes.

Speaking of the great Sicilian-Californian earthquake, Professor Suess, of Vienna, throws the whole weight of geological science on a disc of the earth's crust, which comprises the stricken country, and makes that disc sink down steadily towards the subterranean fires. He cheerfully remarks that when the sinking process is complete, "the hills of Scylla and a great part of the Peloritan Range, near Messina, will be below the water; the Strait of Messina will be widened, and only a fragment of the Eastern Sicilian hills will project from the sea."

Here is a man who, in a manner of speaking, sees a great round piece of the earth's crust being let down by chains, of which he has measured the length, and knows how much still remains to run out. Otherwise his announcement that certain parts will not be lost might be put down to sheer good nature.

In addition, we have the moon theory and the sun theory. According to the first the proximity of the moon shakes up the nearest part of the earth's crust, as happened at Whakatane not long ago. According to the second, the spots in the sun are caused by the upleap of fiery tongues, springing many thousand miles into space. These tremendous manifestations of energy set the ether of space vibrating. These vibrations of either shock one another through space, 95 millions of miles of it, in eight minutes, the last vibration beating in the nearest part of the earth's crust.

When the sun spots are at maximum, these demolitions here below take place in the Northern Hemisphere, and when they are at a minimum the Southern suffers. The North has just undergone its ordeal; soon it will be the turn of the South. Mr. Wragge, to whom we owe this theory, does not want to frighten us, but he feels bound to tell the truth, which, as he sees it, is that the minimum of sun spots being at hand, the Southern Hemisphere must be prepared for the maximum of earthquakes. Now, according to his immediate predeces-

sor in causation, the propinquity of the moon is making things generally unstable for the South also.

On the whole, we may be said to be forewarned. True, Mr. Wragge's theory seems to topple when looked at closely. It does, for instance, appear incomprehensible why, if the shock of the last vibration makes the earthquake, the buildings are not flattened before the collapse of the earth which carries them. Neither does it seem quite likely that the smaller vibrations of the minimum period of sun disturbance should work the havoc in one hemisphere which in the other requires the larger pulsations of the maximum epoch. Further, as ether is of its nature etherial, not material like the air, it is not easy to see how it can be made to vibrate, except in the mind of fancy. As to the moon theory, there does not seem to be much more than coincidence as yet—a thing strong enough rather to suggest inquiry on a certain line, than to justify dogmatic conclusion. Therefore the forewarnings do not seem to be as important as they are in the minds of those who have raised them.

After all, there can be no prevention. When the seismologist predicts an earthquake with the same percentage of certainty as a meteorologist predicts a storm, we shall have to put up with the earthquake as we have to put up with the storm. The best forewarners are the earthquakes of the past. Seismology claims that the records of the seismograph are very valuable, but that claim has been made good only so far as they refer to the past. No one has as yet pretended that the arrival of an earthquake at a given spot can be calculated from earthquake data, as the approach of a storm is calculated from the appearance of that storm at various points of a path usually followed in obedience to the law of storms. Before seismology gets so far, mankind must be content with the fact that the first time we know an earthquake is when it shakes us. Where this has happened it may happen again; sometimes, indeed, a quake comes in a place quite unexpected, as the great earthquake of Lisbon did; generally there are zones of earthquakes coinciding with zones of volcanic activity. The precautions to be taken depend on these facts. Just as in the islands of the Tropics, where there is a hurricane season, men build houses that it is not easy to blow down, so in countries of earthquake visitation men ought to build dwellings that may not be shaken down. San Francisco has recorded that steel frames and ferro-concrete are capital earthquake resisters, and that a certain class of materials is the right thing for discouraging the fire that comes after earthquake disasters. Here are the lessons of experience for men to follow everywhere.

Scientific observation has, it is claimed, established that in every earthquake there are certain areas left untouched. Men are warned to confine their buildings to such areas. It looks as if one were to say an earthquake is like a hand with extended fingers, which leaves undisturbed all the space between the fingers, and to advise that the building sites of the future be confined to these spared spaces. But who will guarantee that the hand will at the next impact strike the same place? Still, it can at least do no harm to confine buildings to such sites, and as this is, after all, the region of the unknown, there may be some chance of immunity. The best chance is, of course, to go and live in a non-earthquake country. But that being impossible, the next best thing is to build suitably, reducing risk to the minimum; and that policy can not be thwarted by the choice of a once spared locality.

The losses in earthquakes are, of course, terrible, and the horrors appalling. But there are greater losses and horrors more widespread in other directions. For example, millions perish periodically whenever the great Yellow River, whose bottom has long been raised by silt above the level of the Yang-tse valley, bursts its banks; and the Plague in Hindustan carries off annually several millions of people. In comparison with these disasters, the quarter million victims of the Messina catastrophe sink into comparative insignificance. It is the first time that docks and similar valuable property have been destroyed. But that is because the people who, like the Chinese returning to the low plains for the sake of the fertility added by the inundation, build flimsily. This very return proves also that men will return to the most dangerous sites when business calls them or profit attracts them. The moral of the Messina story, then, is not to grieve too much, to send what help we can afford to the survivors, and advise them to rebuild on the lines of proved earthquake stability, in the hope that the worst may not happen in the shape of subsidences of the land or submergings by the sea. These are the unavoidable risks of earthquake countries. The others may be minimised into the comparatively easily endurable.

Missing Link.

A paragraph has grown grey going round the papers. It narrates how some skeletons were found in one of the French Departments semihuman in character, the body apish, and the skull human. The alleged combination was said to have been regarded by science as wonderful. On the strength of that some one gave £60 for the same. The number of skeletons not having transpired, we can not say how much a pound these alleged semihuman bones of great importance to science realised. From a manure point of view, the loss is irreparable. As the bones are suspected of being "The Missing Link," there are people who regard the loss as repaired. But there are people who will believe anything, especially if, as in this case, a tooth of the long-haired rhinoceros or some other rhinoceros was found somewhere near. It is said on behalf of the Academy of Science (Paris), that this discovery is important, and on behalf of some person or persons unknown, that they think the "missing link" has been found. Nothing, however, has been heard from any of these parties. It matters little, for there are many more links missing than this skeleton alleged to be semi-human by some one so little known that no one feels justified in mentioning his name.

Remarkable Volcanic Phenomenon.

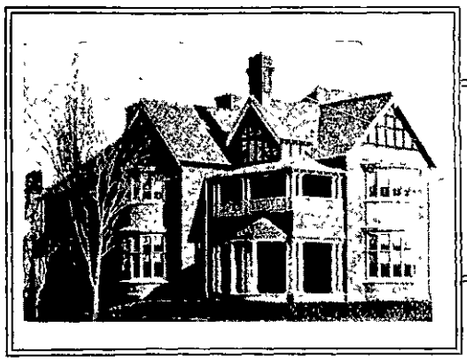
In connection with the fearful catastrophe which has devastated Messina and its surroundings, it is interesting to note that volcanic activity, which is often associated with seismic phenomena, has been particularly observable during the last few months in many parts of the world. The volcano of Kilauea has recently exhibited phenomena never before known in the period during which it has been under close observation, nearly 80 years. The activity in the central pit of the crater is of an explosive and spasmodic type never before noted there. The fluid lava rises from the central pit from 10 to 400 feet within a few hours, and then falls with startling rapidity to rise and fall again in the same way The area of this central pit is about 50 acres, and therefore the amount of matter that rises and falls within it is enormous. The explanation suggested for this unusual action is that in the movements that have ocurred within the earth's crust at that point, an enormous hollow has been formed which gradually fills up with gases, which forces the molten lava into the pit until gas is accumulated sufficiently to fill the hollow and escape, allowing the lava to flow back into the hole. This ingenious explanation appears a very reasonable one, and might possibly account for somewhat similar phenomena observed in the geysers of Rotorua and other parts of New Zealand.

An Hygienic Milk Receptacle.

The health authority of the Dominion years ago entered upon a very uphill struggle to secure purity in the distribution of milk. The problem is an extremely difficult one. So long as cans and bottles in any shape or form are used, there is the constant danger of imperfect cleansing, in addition to the inconvenience of having to return the empty vessels.

An English inventor appears to have overcome the difficulty by the supply of paper milk pails. They have just been put upon the market, and a letter from a Progress correspondent who recently visited the factory of the Mono-Service Vessels, Limited, London, gives a rough idea of the new system. It appears that hundreds of thousands of these paper receptacles are used daily by Dairying Companies all over England The paper milkcan is made of pure wood pulp, with an impervious sterile glaze, and is manufactured so cheaply that it is never used twice, but is destroyed when empty. Milk keeps fresh for a longer period than in the old milk-can, and, therefore, it is said, fewer deliveries of milk need be made. More than 500,000 a day of the new milk receptacles are supplied to provincial dairy companies. Probably some enterprising firm in the Dominion will secure the rights to manufacture this exceedingly ingenious and beneficial invention. It will certainly be heralded with joy by our enthusiastic health authorities.

A Swiss patent has been granted to a Berlin firm for an explosive mixture composed of sulphur, sodium nitrate, small quantities of potassium nitrate and a chromate and a carbonaceous material of fatty or resinous character which melts between 85 and 400 deg. F., becomes plastic and adhesive when heated, and is impervious to water. These ingredients are thoroughly mixed, without the addition of water, and are subjected to high pressure and temperature. The explosive is fired with a fuse, like gunpowder, to which it is claimed to be superior in the following respects: the products of combustion are less voluminous, less irritating to the lungs, and settle more rapidly; the explosive never becomes moist, cannot be ignited under 660 deg. F., burns more quietly, is less sensitive to blows and shocks, and possesses greater explosive power. The same firm has patented a safety explosive composed of ammonium nitrate mixed with one-fifth its weight of dinitro or trinitro compounds of the aromatic series, dissolved in a suitable medium. Potassium nitrate may be substituted for ammonium nitrate and metallic powders may be added to increase the explosive action.



Architecture and Building

Messrs. Collins Bros.' Building.

This is the head office of one of the largest wholesale stationers' businesses in the Dominion, Mr Grigsby, manager. The building was designed by Mr. Wiseman, architect, of Auckland, and erected for some £15,000, the contract price being £2000 less. There are seven stories and an attic. The front is of Australian pressed brick, the whole of the girders and stanchions are steel, and the flooring is designed to carry a load of 4cwt. per square foot. The steel work was prepared by Norman Lang and Co., of Melbourne The joists are of Oregon Pine and the flooring of Jarrah; the lifts and the lighting are all electric. In addition to the main staircase, there is an enclosed fire escape (both of iron) which is used as an extra stairway. The offices, which are up-to-date, are on the ground floor.

The Dominion Ahead.

The *Illustrated Carpenter and Builder* avers scornfully that the growing use of the comera by the general press is likely to prove a valuable factor in stimulating public interest in building. "The camera man has already begun to record the building of the London County Council Hall. The other day a picture appeared in one of the weekly newspapers showing six great wooden piles driven into the mud at the side of Westminster Bridge—that and nothing else. This is the initial step in the building of the embankment, and if the camera man gives us a monthly record for the next ten years, we shall know a good deal about the new County Hall before it is completed." In the Dominion, thanks to PROGRESS, things are a little brighter.

* * * * *

Mr. Alexander Wiseman, of Auckland, has on hand several pieces of work. He is preparing plans for the Y.M.C.A. building, which will run into £10,000 or £12,000. He is engaged on plans for an up-to-date suite of offices for the Auckland Harbour Board, running into some £6,000. This building will be all of stone. He has in hand additions to and alterations of the Baptist Tabernacle for over £3000.

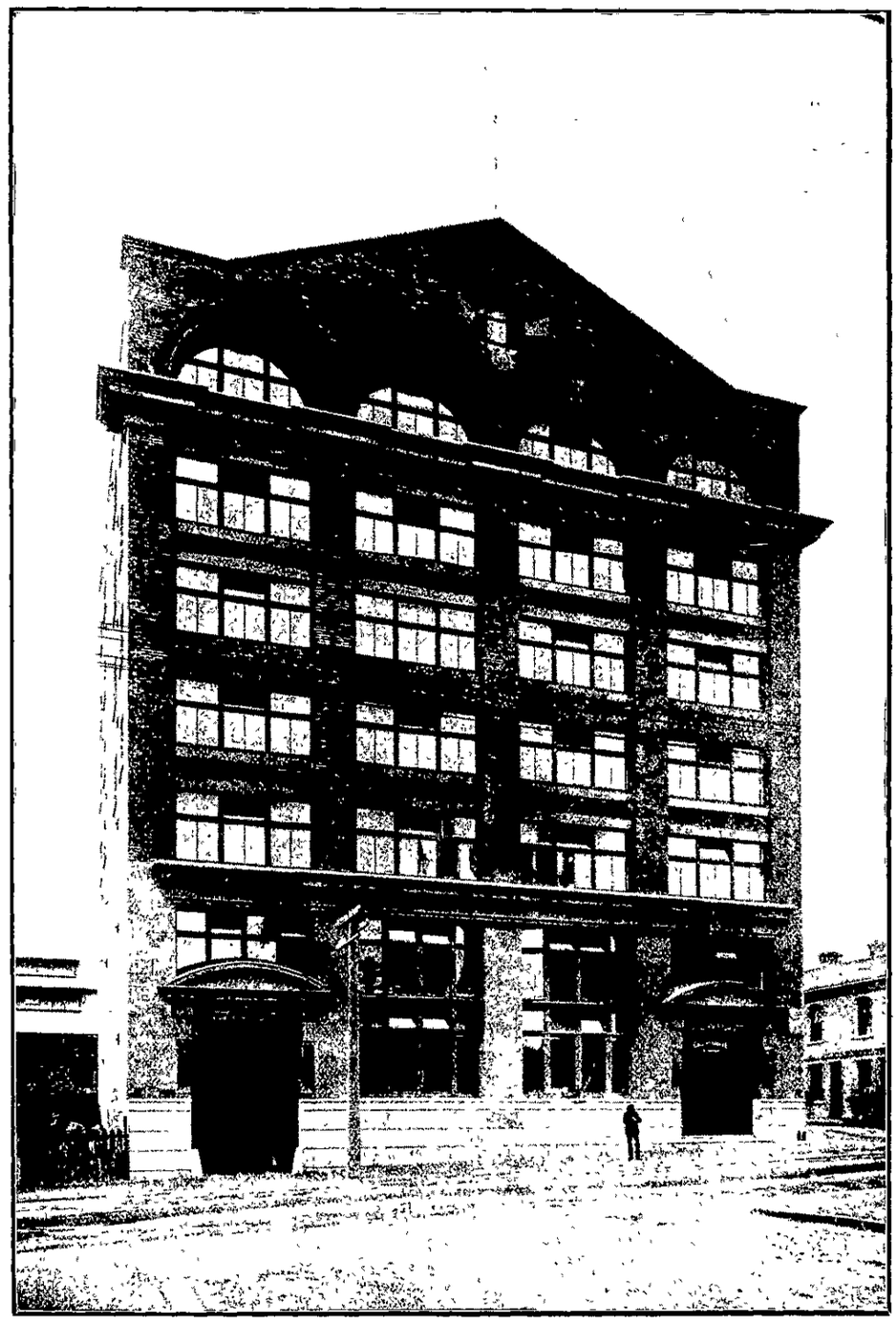
* * * * *

A fine residence is just out of the builders' hands in Market street, Hastings, for Dr. Penrose Barcroft. The building contains large drawing-room, dining-room, four bedrooms, dressing-room, kitchen and all modern conveniences, while in a separate wing is grouped the surgical suite. An effective use has been made with "Eternit" placed in the ceilings and tinted with water colour, while the joists, which show, are treated with oil. Contract price, £840. Messrs. W. Hay and Son, builders; Messrs. Rush and James, architects, Hastings.

* * * * *

Messrs. W. Hay and Son have completed the erection of a 6-roomed villa residence at Hastings, for Mr. J. Tombs. The place is complete with all modern conveniences and conservatory. Contract price, £590. Rush and James, architects, Hastings.

The homestead at Whakamarumaru station for Mr. R. Davis is rapidly nearing completion, and should be out of the contractor's hands early in February. This is an ideal country home, with every convenience and low broad verandahs. The ceilings of the rooms throughout have been erected with "Eternit," tinted in water colour, and exposed joists, which are dressed and oiled. Contractor, T. Styles. Cost, £990. Architects, Rush and James, Hastings.



MESSRS. COLLINS' BUILDING, AUCKLAND. A. Wiseman, Architect

Asphalts.

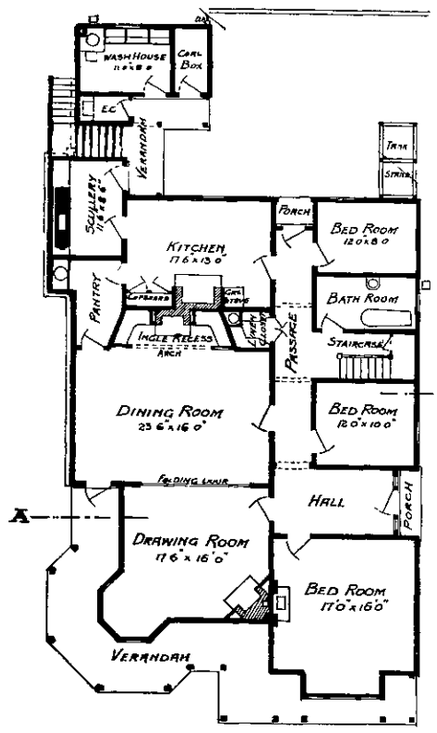
Asphalts vary from semi-liquid to very hard and brittle, and from 100 per cent. pure to half or more earth, sand, or refuse.

Bitumen or pure bitumen also varies. from the hard and brittle to softer and pliable.

Different parts of the world turn out very different products in these hydrocarbons according to the environment.

RESIDENCE OF MR. POTTS, HASTINGS
Rush & James, Architects.

Trinidad has hard asphalt, Switzerland also has very hard asphalt, and three or four States of U.S. of America produce a pure and pliable bitumen peculiar to that country. If hard asphalt is used for portable roofings and damp-courses, the asphalt itself may be fairly good, but it must be softened out to make it pliable, and one of the easiest and commonest ways to do this is to mix an animal fat residue with it. In other cases a soft and semi-liquid material such as coal or Stockholm tar is used, but this of course must be thickened, and a good vegetable matter is the thing to thicken it up with.

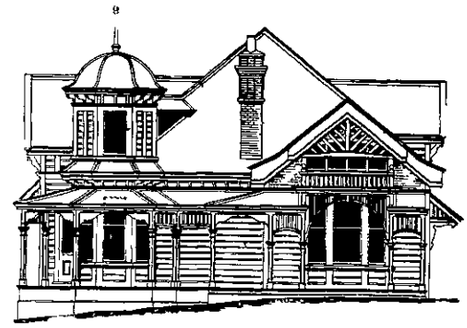


PLAN OF MR DINNIE'S RESIDENCE.

In the process of refining asphalts and bitumens, many different consistencies of residue are the result, and the pure hard asphalt is one of these residues. If the inferior "Oid" or "Ite" is made by using this hard residue mixed with the animal fat its "class name," asphalt, gives it a certain appearance and sound of durability which is very misleading.

The pure bitumen which is in a pliable state when cold should make a first-class and very durable portable roofing or damp-course, and command entire confidence by the profession.

It is therefore very necessary indeed for architects to see that a reliable material is specified, and actually used when their



MR COMMISSIONER DINNIE'S RESIDENCE.
J. H. Burr, Architect.

specification is being followed, and builders should be warned against the possibility of some materials proving unsatisfactory in a year or two, or even less, when doing good work. An instance occurred only recently when one of our leading builders found the "portable material" was actually useless before he handed over the finished job.

These remarks apply with equal force to various flat roof materials now being offered.—*Building*, Sydney.

Public Trust Building.

The £30,000 building erected for the Public Trust Office is shown in the accompanying illustration. It is one of the finest in the city, worthy of the better style of architecture so rapidly springing into vogue, and, what is more, worthy of the grand work the Public Trust Department is doing in the Dominion. By the aid of this department the State takes care of the moneys of all and sundry that like to ask, guaranteeing the principal in every case, paying reasonable interest, and charging moderately for its services. Already there are over two millions worth of property in the hands of the department, and the number of persons benefited is very large. Mr. Poynton, the head of the department, is the head of a fine staff, through whom he is in touch with the large business committed to his department to the very smallest details. The Public Works Department, which built the new office, has taken advantage of the opportunity to use the best materials in the Dominion. It is an example which might well be followed by all the departments of the State. The new Legislative Council building now being erected does not count, as it is to be only a temporary structure. Therefore, the wood and iron unsightliness of its "Carpenters Gothic" may be endured without too much groaning. We fear greatly, however, that the new Government House will not be a credit to the Dominion. Nothing is definitely settled as yet, we understand, but it seems too probable that it will be built of wood in the old bad style, from which the best men are always praying to be saved, for which, on the other hand, the "skinflints" of the Dominion, who seem determined to rule Parliament, are always making permanent provision. The new Government House ought to show the world the very best materials procurable in the Dominion, but we fear it will show the worst, as well as not the best possible style. Of course we should like to be mistaken, but the appearances all point the other way.

HEAD OFFICE OF THE PUBLIC TRUST, WELLINGTON.

On the Employment of an Architect.

It is extremely difficult to get the general public, or, rather, that portion of it which is brought into occasional contact with building operations, to understand that the consultation of an architect is really, in nine cases out of ten, a matter of considerable direct financial gain to the building owner, apart from the saving of worry over the innumerable little technical difficulties and misunderstandings that are always liable to arise, and the benefit of expert knowledge in the matter of arrangement of plan, and the carrying out of a thousand details.

Ferro-Brickwork and Ferro-Concrete.

(F. de J. Clere, F.R.I.B.A.)

The method of constructing Ferro-Brickwork walls, as shewn by the diagram published herewith, consists of bricks proportioned and shaped in such a manner as to allow horizontal and vertical reinforcement without in any way breaking bond. This point has always been the difficulty, but it would appear now that it has been overcome in a satisfactory manner, and the method has received the endorsement of many of the leading engineers in the Dominion

For the last few years the whole of the building world, and indirectly a large portion of the public, have had their attention drawn to a comparatively new form of construction known as "ferro-concrete," and ferro-concrete has been held up as the panacea for all the ills that building construction is heir to It is earthquake proof, it is rot proof, it is fireproof, it is light, it is cheap, and it will supersede brick and stone for walls, and will take the place of wooden or steel joists for floors. We are quite willing to grant that in ferro-concrete the world has gained a most valuable material, and that the discovery, that steel will not rust when surrounded by cement, and that the adhesion of the two materials is so perfect, that they become as it were one is no doubt one of the greatest that has been made in the building world for very many years, second only, perhaps, to the invention of Portland cement itself. The possibilities of the material are wonderful; at the same time, concrete has, and always will have, great disadvantages in wall-construction as compared with brickwork. when the design is in any way intricate and the openings are many. In the late sixties and early seventies it was thought that ordinary concrete would do wonders, and all kinds of apparatus for forming the moulds were invented and used.

In the **Builder** for April 13th, 1867, we read the following:—"Concrete constructions, it can be shown, are cheaper, healthier and safer, and therefore better than ordinary houses. The objection from a sanitary point of view to all the common brick, and lath and plaster constructions, is their absorbency of moisture, and in closely-crowded habitations their absorbency of miasma. Concrete is not by one quarter so absorbent of moisture and damp as brick, while it gives a washable interior surface. Its great economical quality is that it costs about one-half the price of brickwork."

Could anything be more glowing or more conclusive of the triumph of concrete over brickwork. Alas! What do we read now In a late **Laxton**, an absolutely unbiassed publication, it says:—"Some years ago concrete building received a great impetus, arising largely from the novelty of the idea. It has, however, long since subsided."

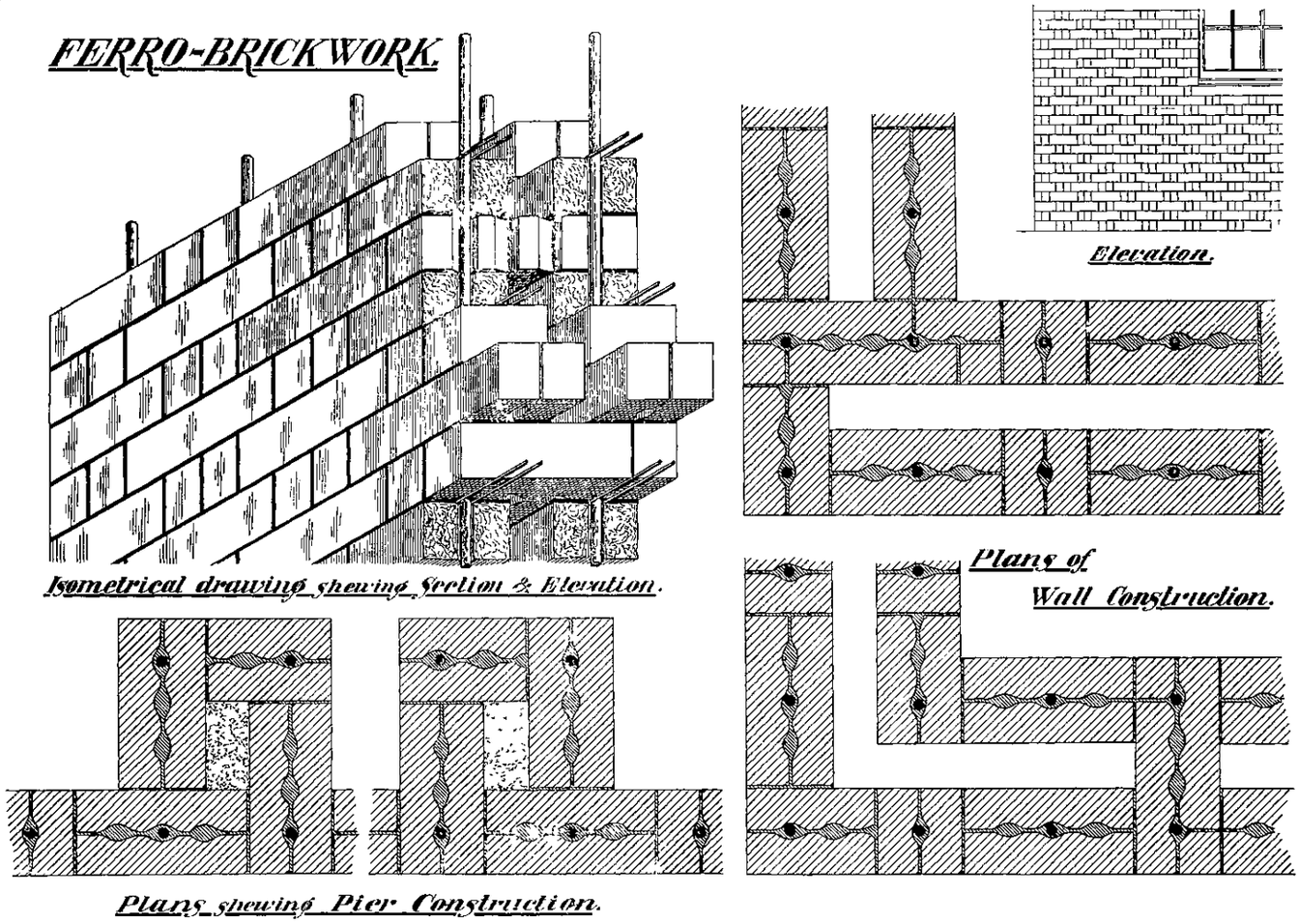
The reasons for this are not far to seek. In all building a practical man allows that the making good of errors is a factor in expense. To rectify a mistake in concrete is most troublesome An opening may be set out only a few inches from the right place, but to correct this error a great deal of boxing may have to be pulled down and re-erected. In brickwork a mistake of this kind is generally made good in a very short time. Should the error be in ferro-concrete, it is appalling to think of the trouble that may be occasioned in order to set it right

Then it is often said that in concrete work skilled labour is not required. There could be no greater fallacy. To begin with, the formation of the moulds requires the greatest care and skill, and this has to be paid for, while the grading of the aggregates and the mixing and depositing can only be done successfully by the most experienced men and these cannot always be found, and, when found, naturally require more than the ordinary labourers' wages.

How is joinery fixed to concrete? is a question often asked, more often asked than satisfactorily answered. Breeze blocks may be **dropped** into the moulds at approximately the right positions, but should they be overlooked, the trouble to get the necessary hold for the woodwork must be immense. Concrete building, too, is necessarily slow, time must be allowed for each filling to set before the next can be placed on it, for, unless the matrix has obtained some strength, the aggregate is simply a pile of loose stones that are constantly exerting a pressure outwards, and are not like bricks, that lie evenly on each other, and whose weight exercises a purely vertical pressure. In concrete, too, as in a chain, the strength can only be estimated as being that of its weakest part, and one faulty mixing of the matrix ruins the whole. Of course, to a large extent this will apply to the mortar used in brickwork, but in it we always have the strength which the "bond" or horizontal lapping of the parts gives, which is entirely wanting in concrete.

With regard to strength. In making comparisons we have, of course, to assume that the matrix in the concrete and the mortar for the brickwork are of the same strength, probably equivalent to a mixture of three parts of clean sand to one part of Portland cement. It may be argued, with a show of fairness, that an aggregate consisting of hard stone, will produce stronger work than one of brick; but even here the assumption has been proved to be wrong, for the mere fact that the adhesion of the cement to the brick is better than it is to the stone more than compensates, when estimating strength, the difference in the hardness of the materials. This was shown by experiments by the English War Department in connection with a large building which they were going to construct. The tests were most carefully made, and the results show that a concrete consisting of six parts of broken bricks (rather soft kind and easily broken) to one part of sand and one part of cement at 31 days old, crushed under a pressure of 20 tons to the square foot, while the same matrix mixed with six parts of broken stone crushed with 14 tons 2 cwts. to the square foot. These weights, we might say, were the average weight, four examples of each kind being tested.* Now, it may safely be argued that if a concrete composed of broken bricks is of so great a strength, then surely the same materials laid in courses would be stronger, just as a coursed rubble wall is stronger than a random rubble wall. The question of shearing or sliding in the different courses may possibly occur. It can only be said that stones or bricks are less likely to slide on each other when they are lying in horizontal beds than they would be when in oblique beds, for it must be borne in mind that many stones in concrete must be lying obliquely against those adjoining. With hoop iron bond, the shearing question might become important, but with wire bonding, and with frequent vertical rods and the joggled joints caused by the notches in the bricks in ferro-brickwork, it would not appear to be a factor for serious consideration.

To the artistic mind, of course ferro-brickwork will appeal strongly. The abominations of stucco are so marked that any relief from it will be welcome, and in ferro-brickwork the actual material used can be left in its natural state, whereas in ferro-concrete it would appear that all "finish" must be in "compo." The reinforcing of brickwork with hoopiron in the horizontal courses is a very old expedient, but in ferro-brickwork vertical rods are introduced, which, combined with horizontal metal, either rods or some sort of mesh that can be entangled in the mortar, will give a result which will make



the walls so strong that a building would be overthrown before being broken. Stone does not stand fire as well as brick; in the official reports made after the San Francisco earthquake and fire ,the protection of all stone concrete by a facing of brickwork was strongly recommended. In connection with this matter, a series of tests made by Mr W. H. Brown, M.S.A., of York, England, are extremely interesting. Mr. Brown did not go further than to test the strength of brick beams when built in good cement mortar and strengthened by wire netting in the horizontal courses instead of with hoop steel. He made his beam eleven courses deep, nearly three feet, and ten feet long, in two thicknesses, one 4½in., and the other 3in. (brick on edge) with a 4in. cavity between with wire mesh bonding in each horizontal joint This beam was found to carry a dead load distributed over the middle six feet of the wall, of 15,300lbs., or more than 6½ tons. Mr. Brown does not tell us the thickness of the wire used in the netting, but it could not have been anything like as thick as No. 7 B W.G., and so it is fair to assume that with the use of the heavier wire, much higher results would have been obtained.

To sum the matter up, the conclusions arrived at are briefly as follows:—

A building, into the construction of which steel largely enters, is very much better able to resist earthquake shocks and the results of settlement, owing to weak foundation, than one in which there is little or no tensile strength in the different parts.

That it is, however absolutely necessary that the steel should be protected from the action of climate or of fire.

That the best results, when compared with cost, will probably be obtained by the steel acting in actual combination with its protecting material, the steel giving the tensile strength, and the other material the compressile.

That burnt clay products are better fire resisting materials than stone.

That a material which "bonds" together is better than one which does not.

That for wall or pier construction brickwork is better than concrete, provided that the "bond" can be retained and yet perfect adhesion to and protection for the steel can be obtained.

That construction in ferro-brickwork would, under ordinary conditions, be lighter* cheaper, quicker, more convenient, more fireproof, and more earthquake proof, will be capable of better architectural treatment, will be more easily altered, and will lend itself much more easily to the attachment of joinery than ferro-concrete.

** See "Specification," No 9, page 69, paragraphs 8, 9, 10, also page 153, paragraphs 6 and 7*

Strength of a Chain.

Sometimes one wants to know the strength of a chain when there are no books of reference at hand. Here is an approximately safe method, which is recommended by an expert of some standing:—

Square the number of eighths of an inch in the diameter of the iron of which the links of the chain are made, and strike off the last figure as a decimal, and call the result tons.

For example, in a chain with links made of iron 1in. in diameter, $8 \times 8 = 64$, and 6.4 ($6\frac{4}{10}$) tons would be the safe working load. Or, in a chain with links of $\frac{5}{8}$ iron, $3 + 3 = 9$, the safe load would be 9 or $\frac{9}{10}$ of a ton.

These loads are, of course, a very long way from the breaking, or "ultimate" strength of the chains, but it must be remembered that a hoisting chain is subjected to the very worst kind of stresses; for the loads are not only "live" loads, but are generally applied in a series of jerks and sudden stresses.

Another important point to remember in using chain gearing is that "the strength of a chain is the strength of its weakest link." Therefore, all connections must be looked after very carefully. Chain accidents have frequently happened through the breaking or failure of some connecting link, and not of the man chain.

The Difficulty of the Hard Wood Floor.

Crow Taylor, in *Carpentry and Building*, strongly advises carpenters to specialise in the matter of laying hardwood floors.

What, you may ask, are the mysterious points surrounding the laying of hardwood flooring which make it so difficult. There is really no mystery about it. It is simply a matter of details and close attention to things that the average carpenter may have considered as immaterial in the laying of flooring. For one thing hardwood flooring, especially where it is cut up into small units or squares, must be kept and laid as free from moisture as possible. The manufacturers kiln dry it until, after testing and baking, there is no further evidence of moisture in it. Then they keep it in heated warehouses, where the temperature varies but little throughout the year. To follow out this idea of close attention to prevent moisture such flooring should not be laid during wet weather unless the carpenter has some dry house or place where he can keep it heated enough to dry out all the moisture that it might absorb from the air. This may look like drawing it pretty fine, but is just what it takes to ensure close joints in the floor after it has been laid and remains so in a heated room for some time.

When a hardwood floor is made by a carpenter from strips which are cut and paved into whatever design is wanted, one mistake that is frequently made is in the end jointing. The side joints are usually made by the flooring man, but the carpenter, from long habit, is inclined to bevel his stock under a little in cutting for end joints so as to ensure a close fit. This is, probably, one of the most common mistakes in floor laying; in fact, one might go into it at length and prove that it is a mistake in any kind of joinery. But we are talking of hardwood floors now, and here is how it is a mistake to saw under or bevel in cutting end joints in hardwood flooring. All hardwood flooring is finished off after it is put down. In the process of finishing off some strips may not be cut down much, but some are dressed down 1/16in. any way, and, naturally, if a joint has been bevelled or cut under when the face it cut down the joint immediately begins to open up, and it opens up in proportion to the amount it has been bevelled and the amount that it has been cut down. The thing to do, therefore, in joining hardwood flooring where it is in thin strips or standard thickness, is to use a fine saw and cut perfectly square. Then when you get a good joint you can feel safe about the joint, even if 1/16in. is taken off the top in smoothing down. So you see, instead of being a matter of mystery, the proper laying of hardwood flooring is a matter of simple intelligence and close attention to small details.

Leaky Roofs.

Leaky roofs should be like the snakes in Ireland—they oughtn't to be there. There ought to be no leaky roofs. Most people will agree with a writer in the *National Builder*, writing in a recent issue, who says that if the roof work of buildings is properly executed, they should remain perfectly water tight as long as the material lasts. The bad workmanship which results in leaky roofs is frequently due to the owner's parsimony. Cheapness and good quality do not run in the same channel. And it is only so far as owners are careful to engage or enter into contract with thoroughly competent mechanics—aiming more to secure good work than to save a few pounds in expenditure—can they reasonably expect to obtain good work, either in roofs or anything else. This is true in reference to building houses as it is in relation to goods and merchandise; and so long as owners follow the practice of admitting botchers in competition with competent mechanics, and accept their low estimates with favour, making no distinction between mechanics in a proper sense and mechanical frauds, no right or intelligent cause of complaint can exist. If men undertake to do work for ten or twenty per cent. less than a right and paying price, it is but natural that they should seek to compensate the discrepancy by doing the work undertaken in quality on a par with the price for which the work is undertaken.

Some hints in this connection are very useful. For example:—

It is well known it is difficult to solder tin when it is covered with water, yet it often happens that in removing ice or snow from a roof holes are cut in the tin by the shovel. Such holes can be stopped without much trouble by taking a piece of heavy iron, of suitable size, with countersunk holes for ordinary screw heads. A piece of thick cloth is to be cut the size of the iron, well soaked in heavy iron paint (red oxide), the cloth placed over the leak, and the piece of iron screwed down over the cloth. Holes can be punched through the tin by means of a prick punch. If the tin can be wiped dry before applying the cloth, so much the better.

If water is running down the roof, a dam can be made above the leak, of putty or clay, to keep the water off until the leak is stopped. In some cases white lead, iron paint, or putty will do; or, if the leak is not exposed at the time to running water, the cloth and paint will do. A little varnish mixed with the paint will make it stick better. After these cloth patches become dry they will hold water as well as solder, and perhaps better, as they are more elastic.

If the flashing breaks away from the brick fire wall, it can be fastened by taking fence nails and putting them through suitable washers to enlarge the heads of the nails and driving them through the tin into the mortar joints; then the tin (where it joins the brick) can be plastered with a cement made by mixing dry sand with iron paint to the consistency of mortar. This cement is the best medicine for repairing roofs known, and is cheap enough to suit anyone. If a leak occurs between wood and brick, the same cement can be used, and in many cases it can be used on gravel roofs. For repairing about chimneys this cement is unequalled.

When a gravel roof is wet, it is evident it would be difficult to repair it with paint, cement, or hot tar. Yet, if the roof leaks, it is at this time the repairs are required. In such a case take the best Portland cement and, perhaps, sand, mix it with water and apply to the leak. As the cement will harden under water, it will adhere to the gravel on the roof, and should stop the leak. When the cement becomes hard and dry, it can be painted with iron paint or coal tar.

A good cement for roofs can be made by mixing coal tar that has been boiled, or when hot has some pitch or resin mixed with it, with dry sand. This becomes as hard as stone. It is something like what cement pavements are made of. The sand has a tendency to keep the tar from running off.

APPLICATIONS FOR PATENTS.

The following list of applications for Patents, filed in New Zealand during the month ending January 28th., has been specially prepared for PROGRESS.

25368—The Monotype Machine (Colonial Patents) Syndicate, Limited, London, England: Multiplex composing-machine.
25369—G. A. Bennett, Goodmayes, and J. A Smith, Leytonstone, England: Pneumatic tire.
25370—A. T. W. Allan, Henderson, and A. R. Rann, Auckland: Roller mill for tailings, &c.
25371—J. P. H. Lund, Rockhampton, Q.: Ship's rudder.
25372—T. Hawkins, London, Eng.: Slop-pail, &c
25373—Maxim Silent Fire-arms Company, Jersey City, U.S.A.: Gun-discharge silencer.
25374—A. Thomas, Detroit, U.S A.: Reinforced concrete.
25375—G. T., T. M., and J. K. Muir, jun., Melbourne, Vic : Bedstead-frame cramp.
25376—C. M. Cruickshank and G. Hadlee Timaru: Bathroom, &c., steam-preventer.
25377—A. Cannell, Auckland: Revolving show-stand.
25378—G. T., T. M , and J. K. Muir, jun.. Melbourne, Vic.: Bedstead-fastening device.
25379—W. F. Dugins, Kew, Vic : Fastener for boots, etc.
25380—R. F. Lean, Lithgow, N.S.W.: Lubricant.
25381—F. E. Darling, Melbourne, Vic.: Silver-coating fluid.
25382—S. Ewing, Burwood, N.S.W.: Fire-extinguisher.
25383—S. F. Haughey, Cheviot: Inflating pneumatic tires of vehicles.
25384—F. H. Trevellian, Wellington: Machine for ruling and preparing paper ribbons.
25385—H. F. Cameron, Waikino: Water-closet pan.
25386—H. A. Nicholson, Otautau: Beating-bar.
25387—H. A. Nicholson, Otautau: Flax-stripper
25388—F. O. Von Rome and G. Hutchinson, Christchurch: Meat-safe
25389—H. T. Fletcher, Auckland: Rotary canvas buddle.
25390—Nightingall Gas Control Company, Limited, Melbourne, Vic.: Gas lighter and extinguisher.
25391—A. Walker and M. W. Marriage, Dunedin: Removing sand from castings
25392—F. Stubbs, Auckland: Hot-water circulating system.
25393—W. J. McDonald, Kaupokonui, and J. Hopkirk, Hawera: Milk-agitating apparatus.
25394—J. M. Madden, Lower Riccarton: Motive-power transmitter.
25395—W. Seifert, Palmerston North: Flax-treatment.
25396—J. W. Stamp and W. J. Powell, Melbourne, Vic.: Offal-treatment.
25397—De Dion Bouton (1907), Limited, London, Eng.: Pressure bearing for bevel gears.
25398—Patent Hydrocarbon, Limited, London, Eng.: Hydrocarbon oil treatment
25399—J. Fischer, Moonee Ponds, Vic.: Bael fasteners.
25400—H. Bruce, Whatawata: Portable drill.
25401—J. J. Loke, Scheeningen, Holland: Tile, &c., manufacturer.
25402—C. A. Parsons, Newcastle-on-Tyne, Eng : Turbine.
25403—A. E. Peppercorn, Christchurch: Preventing steam and water escaping through gauge-glass when such becomes broken.
25404—H. E. Thew, Rangitata: Tine-harrow attachment.
25405—W. H. Caldwell, Mallaig, Scot : Sensitised photographic film.
25406—W. H. Bird, London, Eng.: Pneumatic tire.
25407—J. Hutchings, London, Eng.: Internal-combustion motor-engine, turbine, &c
25408—J. Hutchings, London, Eng.: Supplying combustible fluid under pressure.
25409—British Fixator, Limited, London, Eng.: Preventing accidental movement of rotating parts.
25410—G. W. Otterson, Wellington: Boot-heel.
25411—V. R. Blair, Wellington: Acetylene-gas generator.
25412—United Shoe Machinery Company, Paterson, U.S.A.: Fastenings-inserting machine.
25413—United Shoe Machinery Company, Paterson, U.S.A.: Sole moulding, &c., machine.
25414—United Shoe Machinery Company, Paterson, U.S.A.: Pressure-applying machine.
25415—United Shoe Machinery Company, Paterson, U.S.A.: Lasting, &c., machine.
25416—United Shoe Machinery Company, Paterson, U S A.: Boot and shoe machine.
25417—United Shoe Machinery Company, Paterson, U S.A : Boot-sole trimming, &c , machine.
25418—E. N. Waters, Melbourne, Vic.: Phonograph and record.
25419—T. H. Gillman and L G. Grace, Hawera: Hydraulic vacuum pulsator.
25420—F. F. Porter. Oratia: Breaking-down, &c., machine.
25421—T. T A. Jackson, Chatswood, N.S W : Shirt-collar.
25422—F. C. Lippiatt, Otahuhu: Swingle-bar connection.
25423—C. H. Mills, Patautahi: Wire-strainer.
25424—G. W. Penney, Gore: Wire-tightener.
25425—A. L. J. Tait, Dunedin: Flax-dressing machine.
25426—R. M. Smith, Coal Creek Flat: Resilient wheel.
25427—F. H. Crittall, Braintree, Eng.: Manufacture of expanded metal.
25428—The Imperial Writing Machine Company, Limited, Montreal, Canada: Typewriter.
25429—G. W. Penney, Gore: Broom handle and socket.
25430—A. S. Duncan, Christchurch: Loading and transporting device for disc harrows.
25431—J. and J. W. Hardley, Auckland: Ventilator and ridging.
25432—R. B. Wight, Takapuna: Potato-harvester
25433—C. Y. Dally, Masterton: Washing-machine.
25434—J. Hutchings, London, Eng.: Pumping-engine.
25435—J. Henrichsen and C. J. Hemmingsen, Copenhagen, Denmark: Milking-appliance
25436—D. R Fisher, Feilding: Quadding apparatus of linotype machine.
25437—S H Donkin, Wellington: Safety pocket.
25438—T. Firth, Wellington: Horse-controller and wheel-lock.
25439—J. M. Neno, Wellington: House spouting and ridging
25440—S. Malden and R. E. Rees, Christchurch: Candle-extinguisher.
25441—A. J. Baker, Christchurch: Tire-inflating pump.
25442—J. Godber, Wellington: Ornamentation for bride-cakes, &c
25443—W. A. Van Berkel, Rotterdam, Holland: Meat-slicing machine.
25444—W. L. and J. W. Davidson, Hutt: Tobacco cutter.
25445—C. F. Birch, Karori: Platform-bracket.
25446—J Jonson, Stratford: Shielded fishing-hook.
25447—A. M. Grainger, Dunedin: Weed-extracting device.
25448—A. M. Grainger, Dunedin: Rabbit trap.
25449—F. W Bliss, Woodville: Bacon-slicer.
25450—W. Wilson, Christchurch: Acetylene-generator.
25451—E. A. A. Laery and G. T. Stewart, Featherston: Ticket-rack holder.
25452—G. T. and H. H. Stewart, Featherston: Searing and docking knife.
25453—W. Dall, Dunedin: Wire-fence dropper.
25454—L. G. Grace, Hawera: Kerosene-siphon.
25455—Oliver-Roche Company, New York, U.S.A.: Water-purifier.
25456—Oliver Roche Company. New York, U S.A.: Water purifier.
25457—Hydrocarbon Converter Company, New York, U.S.A.: Hydrocarbon vaporiser.
25458—H. H. Leathwick and N. Brooke, Timaru: Pie-dish.
25459—H. J. Wood, Christchurch: Kettle-lid
25460—W. C. Southgate, Dunedin:: Tip for bottle-washing brush.
25461—H. B. Murray, Dunedin: Disposing of dredger-tailings.
25462—K. W. Hedges, London, Eng : Gas-heating stove.
25463—United Centadrink Manufacturing Company, New York, U.S.A.: Carbonating and vending apparatus.
25464—S. H. Davey, Waitoa: Wheel-lock and horse-holder.
25465—W McGee, Wellington: Rein-holder.
25466—S. H. Donkin, Wellington: Mattress.
25467—L. Lilley, Stratford: Angle-bracket.
25468—G. F. Tasker, Christchurch: Fire-alarm.
25469—M. Belk, Palmerston North: Propeller.
25470—L. G. Grace, Hawera: Tire-puncture preventer.
25471—L. G. Grace and T. H. Gillman, Hawera: Hydraulic ram.
25472—F. G. Skelton, Hastings: Lid for tins.
25473—T. D. Jones, Sydney, N.S.W., and H. Ringstad, Redfern, N.S.W.: Advertising cabinet.
25474—G. Sollitt, Hastings: Venetian blind.
25475—J. Mitchell, Auckland: Building-construction.
25476—G. L. Pearson, Christchurch: Well-boring appliance.
25477—W. G Dart, Wellington: Billiard-dining-table.
25478—P. T. Sheedy, Heddon Bush: Drill and ridge scarifier.
25479—A. H. Jones, Invercargill: Locking-bolt.
25480—R. Millis, Dunedin: Gold-saving process and apparatus
25481—C. Mills, Christchurch: Window-lock.
25482—E. H. Brooker, Medbury: Suction-blast seed stripper and dresser.
25483—G. H. Buckeridge, Christchurch: Watch, &c., holder.
25484—S. G. Roseman, Auckland: Broom-handle fastener.
25485—E. McPartland, Taumarunui: Dust-pan.
25486—W. Morton, Dunedin: Wood framing metal joint.
25487—J. G. Watt and W. Barradale, Auckland: Grader.
25488—A. Simonson and O. R. Petersen, Masterton: Gate or door fastening.

Full particulars and copies of the drawings and specifications in connection with the above applications, which have been completed and accepted, can be obtained from Baldwin and Rayward, Patent Attorneys, Wellington, Auckland, Christchurch, Dunedin, etc.

The recent trial of the British battleship "Invincible," in which she attained, under reduced power, a speed of 25 knots, was followed by a full power trial in November, when she steamed at the unprecedented speed of 28 knots on a continuous run of eight hours 'duration. This is certainly wonderful going for a ship protected with 7 inches of armour and carrying a battery of eight 12-inch guns. It is 9 knots faster than the speed of any battleship now in commission in our navy, and 2 knots faster than the one-mile trial speed of our swift cruisers of the "Salem" type. Moerover, it exceeds by 2 knots and 2½ knots respectively the trial speed of the "Lusitania" and "Mauretania," which are to-day the fastest merchant vessels afloat.

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An authority states that the best test for cylinder oils is to heat them in a current for one hour at the temperature corresponding to the steam pressure at which they are to work. The loss in weight should not exceed 0.5 per cent.

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Mme Curie, who with her husband, the late Prof. Curie, discovered radium, has been appointed Chief Professor of Physics in the Faculty of Sciences, Paris University. Mme. Curie succeeded her husband in the professorship held by him in the Faculty of Sciences before his death.