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Editor: F. J. CAMM

VOL. IX. AUGUST, 1942 No. 107

FAIR COMMENT—BY THE EDITOR

Mechanical Aptitude

MOST people at some time during their lives explain that if they had their time over again they would have chosen another profession. The world is full of square pegs in round holes. Nearly always it is found that an individual is unsuited to his job because he has had no voice in its selection. At school-leaving age his parents, in the mistaken notion that they understand him, select his career. They have been told by some half-informed friend that engineering, or chemistry, or electricity, or wireless is providing good opportunities. They have probably received a letter from his headmaster stating that the boy has shown distinct aptitude for essay writing, or handcraft, or mechanics, and therefore should become a journalist, an architect, or an engineer. With a fairly lengthy experience, not only in advising, but in observing, I can say with emphasis that the opinions of headmasters regarding the aptitudes of their pupils is of little value. In the first place a headmaster spends his life amongst youths. Effectively, he never grows up, and in many ways retains youthful inexperience. He is in the world, but not of it.

I remember, about twenty-five years ago, the headmaster of a Northern school was in ordinately proud of what he thought were the powers of oratory of a particular pupil. In school debates he was dominating, and the headmaster lost few opportunities of showering praise upon this unfortunate pupil, who in course of time began to believe that he was a great orator, and a lineal descendant of Socrates. The other boys, probably with equal powers of expression, were thus imbued by the schoolmaster with an inferiority complex. The cynosure of the headmeaster's misplaced admiration was regarded by the other boys as a pet. When the boy reached school-leaving age he was advised to take up a career of oratory, and, in fact, he eventually was successful in obtaining several platform engagements. The headmaster sought my advice as to possible openings, and I frankly told him that I thought the boy's prospects had been spoiled. The lad had been converted into a human parrot. He suffered from the delusion fostered by the headmaster that he *was* an orator. The parents of the other scholars were invited to the school functions to hear him speak. Withal, the boy adopted a self-deprecatory air of mock modesty.

My frank and forthright remarks to the headmaster shocked him. I told him that the boy was vain, and that his modesty was a prime part of his vanity in that he prided himself on being modest. The boy in acknowledging the plaudits would refer to "his appreciation of the reception they had given to his poor efforts," when he really thought that he had spoken something worth while. The age of the boy at this time was 15½ years, and for any headmaster or anyone else to presume that a boy of these tender years could have anything to say worth listening to, or to have any opinion which was not based upon the teachings of older men, is just a fantasy and a phantasm, a snare and a delusion. However, I warned the schoolmaster against this form of childish adulation, and I warned him against the idea that a boy with a good memory for what he had read, and who merely repeated it upon the platform, was only regurgitating unoriginal thoughts, and like the ruminative quadruped, was merely in a literary way chewing the cud.

True Prediction

THIS was, as I have said, several years ago. My prediction has come true. The boy's life has been ruined, and he has endeavoured to eke out a meagre existence by hiring himself as a political speaker to any particular party, or as a platform speaker on any subject such as teetotalism, or alcoholism, provided that the necessary fee is paid. He has, in fact, become a tub-thumper of the Hyde Park variety. Many other boys' lives have been ruined by parents and headmasters in a similar way.

Now most boys live a life of repression and suppression owing to the attitudes of parents and headmasters who have always made the mistake of endeavouring to produce a standard boy instead of permitting them to develop their own ego. Hence, the square peg in the round hole.

Now the Ministry of Labour seems to have reached the same conclusion, for they assert in one of their recent notices that the first essential of any apprentice training scheme is that *suitable* apprentices should be selected. They draw attention to a particular leading aircraft firm which in the autumn of 1938 conducted some research into the question with important results. About 100 apprentices who had been in the firm for upwards of three years were given a number of aptitude tests which were devised by the research staff of the National Institute of Industrial Psychology, also a well-tried intelligence test devised some years ago by Professor Burt. Some of the older apprentices were asked for their own ideas of their suitability or otherwise for work of an engineering nature. No less than 17 per cent. of these apprentices which, as the Ministry agrees, is a very disturbing figure, gave their opinion that they were unsuitable as engineers. The question of suitability is fundamental. In the past it seems to have been imagined that providing a boy was intelligent, as shown by his school record, he would make, for example, a good engineer.

Aptitudes and Intelligence

RECENT investigations, however, have shown the existence of certain aptitudes which are relatively distinct from general intelligence. That is to say, a boy such as the one whom we have quoted, who might have a retentive memory for quotations, and might link them together to form a speech which would impress those who could not remember the quotations, and thus delude them into thinking that the words were his own original thought, might have a good record for general intelligence but lack the aptitudes which would make him an engineer or a journalist. To the majority of engineering occupations aptitude is of prime importance, and a boy of high intellectual level may fail because of lack of them. The vocational tests to which the apprentices were submitted assessed with considerable accuracy the aptitudes or lack of them, and disclosed that the spatial factor is of great importance. The skilled craftsman, for instance, is concerned with the reading of drawings, and the draughtsman with making them. One process involves the visualisation of a three-dimensional solid object from a two-dimensional flat representation of it; the other the reverse. A rough division was made of the apprentices who, on taking the intelligence test, achieved the following results: Excellent, 10 per cent.; good, 20 per cent.; average, 40 per cent.; fair, 20 per cent.; poor, 10 per cent.

Apprentice Efficiency

THE conclusions reached by this test were that the general apprentice efficiency has been noticeably raised. As a result of the psychological testing of applicants the earlier apprentices compare unfavourably with the later apprentices. The successes of apprentices in their studies and examinations show a marked improvement. In June, 1940, 11 apprentices in the particular firm passed all three subjects in the first year National Certificate Examination out of 50 who sat for it—22 per cent. In June, 1941, 19 out of 31, or 61½ per cent., passed all three subjects of the Second Year Examinations, while the percentages of those passing two of the three subjects in 1940-1941 were 38 per cent. and 97 per cent. respectively. The percentages of apprentices now being rejected at the end of their six months' probationary period has diminished almost to zero. It has been found that school reports are valueless.

My point is that every employer has a duty to discharge pupils and apprentices if after six months they are found to lack the necessary aptitude. If they do not do this, they are ruining the careers of the pupils and the apprentices.

Crewless War Machines

Remote-controlled Land, Sea and Aircraft in Warfare

By K. DOBERER

A remote-controlled tank of the future.

DURING summer, 1933, the first unmanned and remote-controlled aeroplanes were put into commission in Great Britain. They served as objectives for target practice of the anti-aircraft artillery. The robot apparatus was installed in a seaplane and in land 'planes of the De Havilland Aircraft Company. The existence of the robot machines was kept secret. Some years later there were deliberations at air expert circles in London in how far this type of robot machine could be actually employed for defensive purposes. Apparently in connection with these considerations, the general public was acquainted with this type of the crewless fighter 'plane. During some festive occasions in June and July, 1935, they were demonstrated in public. De Havilland machines of the Tiger-Moth type with a Gipsy Major motor of 130 horsepower were used. They had a speed of 100 miles per hour and rose wireless navigated to a height of 10,000ft. The installed robot could be remotely controlled from the operating centre within a distance of ten miles. The operating centre was situated on the ground and on other occasions on a warship.

After the first of these machines had been shown at a fête for the benefit of the Air Force on June 29th, 1935, further manœuvres with robot 'planes took place on July 17th of the same year in the presence of the King during the great Portsmouth naval parade. One of the machines attacked warships and was hit after 320 shots had been fired and crashed into the sea. A second of the remote-controlled machines was giving a climbing exhibition and crashed after it had reached a height of 10,000ft.

The result of these exhibitions was an order to the De Havilland Works for a whole squadron of remote-controlled 'planes. The machines of this squadron required for target practice were biplanes similar to the Tiger-Moth type, but the body was constructed of wood instead of metal. This type, Queen Bee Robot Trick, remains afloat even after it has been shot down. The new machines had a speed of 110 miles per hour and were remotely-controllable up to a height of 12,000ft. They could also on command, but of their own accord, execute certain figures whilst performing acrobatic flying. During the English Fleet and Air Force manœuvres at Alexandria in Egypt in 1936, two of these robot aeroplanes attacked the cruiser *Shropshire*, and were shot down. As a result, British experts arrived at very favourable conclusions for the anti-aircraft artillery of the British Fleet.

The unmanned Queen Bee Robot Trick machines also took part in the autumn naval manœuvres, 1936. After a catapult start they remained in the air for three hours at an altitude up to 3,000 metres. Up till then, the operating centres for the robots were installed on a number of different warships, but were then intended to be concentrated.

Shortly before the war, the older aircraft carrier *Argus*, built during 1917, was converted into the robot-carrier and also into the commanding centre of the robots. The *Argus* has a displacement of 14,700 tons and a speed of 23 knots.

The Motorised Bomb

Whilst the unmanned fighter aeroplane is a pronounced defensive weapon, there is a wireless-navigated type of aeroplane—outwardly bearing a great likeness to the Ramming Robot—which is just as much a distinctive weapon of attack. This is the remote-controlled air-torpedo, a small streamlined and in itself complete aeroplane carrying a load of explosive, packed in its metal body.

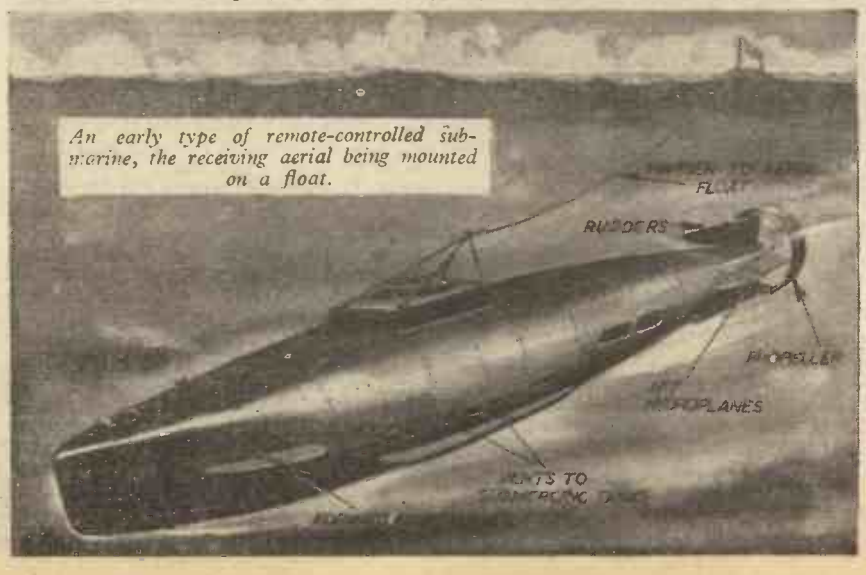
With this type of warplane a number of apparently unsuccessful experiments were made during the Great War. After the war, however, it seems that the Americans had learnt to master the remote steering of these small machines, if employed mainly for flights on a straight course. Lieutenant-General William Mitchel, the Commander-in-Chief of the American Air Force during the Great War, describes manœuvres with such air torpedoes. The air torpedoes were wireless controlled and equipped with a gyroscope for directional stability. According to Mitchel's report, three of these torpedoes were despatched to Garden City on Long Island and to Trenton in the State of New Jersey during the experiments. All three hit the bull's-eye. They reached their target, having travelled a distance of about 70 miles.

The technical evolution of the air torpedo was later on divided into two sections of constructional development which, however, both differ in one important detail from the Ramming Robot and the wireless-controlled bomber. All air torpedoes possess an electric eye.

The Ramming Robot, in the service of the air defences for ranges within sight of the commanding centres, and the remote-controlled bomber, in the service of its directing 'plane for ranges within its sight, do not require an organ of this kind.

It is immaterial if the remote-controlled air torpedo is constructed as a light bomber, able to release a number of bombs, or as a winged bomb of magnesium alloy, it always travels out of eyesight during its long journey. Consequently, the operating centre which sent it out and controls it constantly must be able to ascertain continuously its position. This task is maintained by the electric eye of the air torpedo, constructed on the principle of a television apparatus.

An image of the territory being passed over is taken up by a system of lenses fixed to the bottom of the air torpedo. This picture is then transmitted to the centre of operations by a system of selenium cells in the torpedo,



An early type of remote-controlled submarine, the receiving aerial being mounted on a float.

which converts the incident impression of light into current surges. In a type of air torpedoes, built in the United States and developed along the line of the day bomber, the load of explosives—normal bombs are used—can be divided in several sticks. The remote-controlled bomber returns repeatedly, flying in spirals, to the attacked objective and always when the dark line of the ship in the lighted sea is projected on to the ground glass of the focusing screen of the televisor at the operating centre a new stick of bombs is released. This type can carry a load of explosives up to a thousand pounds. When the bombs are dropped the 'plane returns to its taking-off place.

This kind of remote navigated bombing machine was primarily intended to be used as a special weapon for the American giant airships *Akron* and *Macon*. The machines, 12 metres in length, started from the moving airship and it was not necessary to undertake complicated starting manœuvres with automatic contrivances. When the bombing machines returned to the airship, they had to alight on the sea. As was proved by trials of the German giant airship *Hindenburg*, they also could again be linked up with the moving airship whilst the 'planes were travelling alongside it in the air. This series of experiments has been discontinued owing to the destruction of all the giant airships mentioned. However, similar tests are proceeding with catapult starts from battleships.

In development of the original idea of the remote-controlled air torpedo, Japan is trying to build the winged bomb. This type of air torpedo is a small, compact aeroplane and all constructional parts are made of metal. But all the metallic parts consist exclusively of an alloy composed of aluminium and magnesium. Similar to the incendiary bombs, the metal case will also ignite after the detonation of the explosive contents, and then cause a white-hot, inextinguishable conflagration. In an air torpedo attack on ships, when sea water pours into leaks torn by exploding torpedoes, the vigorously burning alloy would only cause further most violent explosions.

Remote-controlled Submarines

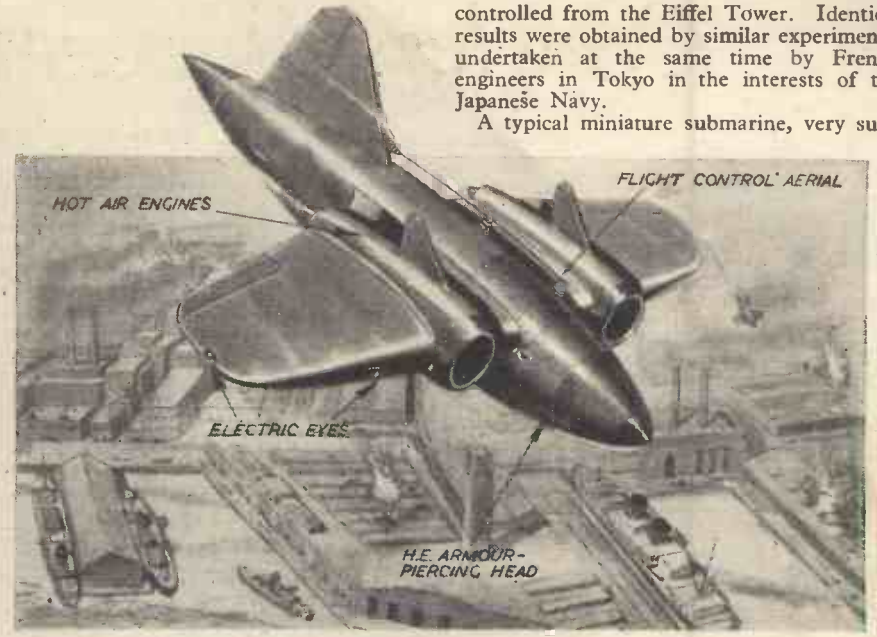
Soon after Christoph Wirth's successes with his remote commanded electro boat on the Wannsee Lake near Berlin, the French engineer Gabet constructed a remote-controlled submarine of 36ft. length and a diameter of 3ft., which manœuvred without a crew. The receiving aerial, attached to two masts, was a fixture on a float. The float itself was dragged along by the submarine on a cable. The submarine was propelled by two screws, driven by an electro motor, which was supplied with power from an accumulator battery. As the miniature submarine did not possess a torpedo tube and the explosives were stored in its own bow, it really had become a giant torpedo. In consequence, it was necessary to bring the whole submarine up to the ship about to be attacked, and explode it by remote ignition.

During the Great War the British Secret Service was informed by agents that the Germans were making experiments in the North Sea to control submarines by radio from aeroplanes. An actual confirmation of this report was never forthcoming nor were results of these experiments ever made known.

The American Navy is said to have a remote-controlled sea-torpedo with a powerful electro magnet in its point. This electro magnet is switched on by wireless during the latter part of its way and then automatically corrects the course of the torpedo towards the armour-plated battleship to be torpedoed.

Trials with a small submarine were made by the French Navy. During the successful experiment, the miniature submarine was manœuvring on the Seine and was remotely controlled from the Eiffel Tower. Identical results were obtained by similar experiments, undertaken at the same time by French engineers in Tokyo in the interests of the Japanese Navy.

A typical miniature submarine, very suitable for this purpose, was constructed by Captain-lieutenant Zeiner-Henrikson. It was to be used for the Norwegian Coastal Guard. Like the remote-controlled fighter speed-boats, this diving craft was only 50ft. long. Propelled by compressed air, the boat had a radius of action amounting to 12 miles.

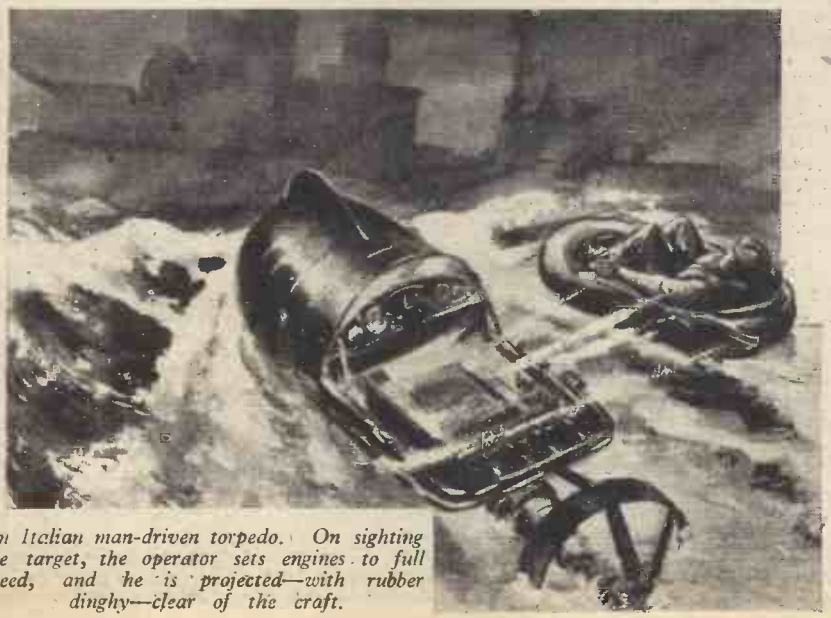


An impression of a robot air-torpedo, navigated by wireless.

The disadvantage of being propelled by compressed air is, in this case, that the torpedo is converted into the noisiest craft on or under the sea. With a submarine sound detector, constructed by Thomas A. Edison during the Great War, a torpedo could be heard at a distance of 20 miles. It therefore stands to reason that the American Navy uses electro motors to drive remote-controlled miniature submarines. Therefore, also for the large torpedo types, with a calibre of 25in. and a high-explosive T.N.T. load of 700 pounds, electro motors are used.

The Stalk-Eyed Monster

Important objections have been made against the use of such remote-controlled machines in actual warfare, whilst their employment on the shooting range for target practice is, without a doubt, most useful. In the case of war, however, a remote-controlled tank has to face difficulties of quite a different nature than perhaps a remote-controlled bomber or a fighter speed boat would have to. These machines, after all said and done, operate in equable surroundings, in which there are, generally speaking, no obstacles—in the water and in the air. The remote-controlled tank, however, must be ready to deal with a newly arising obstacle on its course within the fraction of a second. Hardly has the vehicle safely eluded a tree or has felled it by a tremendous impact than it may be in front of a trench. It has become evident by experience that trench obstacles especially ensnare the tanks in a trap and make them quite helpless. It requires all the experience and the circumspection of the tank driver to arrive at a quick decision as to the route to be then followed. Even if the action control would move up to a distance of 100 yards from the tank, it would prove impossible to give a final command from there how to deal with a simple trench, which is 30 centimetres too wide or the angle of the rampart of which is only 5 deg. too steep. In his machine, the tank driver may be able to save himself by promptly accelerating his speed. But the remotely-controlled tank would have certainly been hopelessly marooned in the trench.



An Italian man-driven torpedo. On sighting the target, the operator sets engines to full speed, and he is projected—with rubber dinghy—clear of the craft.

Working Under the Sea

The Peculiar Effects of Working in an Atmosphere of Compressed Air

By Professor A. M. LOW

TUNNELS have made possible the elaborate surface transport systems now in use in every civilised country. They enable railways to pierce mountain ranges, honeycomb large cities, and pass under rivers. Every year sees the number of great tunnels increased as man becomes more impatient at the delays imposed by natural barriers to road and rail. Engaged in making them are thousands of men who have to work day after day in an atmosphere of compressed air. Science has been able, not only to devise methods of driving tunnels in safety under river beds and through ground soaked with water, but also to safeguard the men who make them.

Modern diving equipment as used by deep sea divers. This equipment is provided with many accessories, such as electric light, and oxygen and air apparatus.

It is obviously essential, when making a hole in wet clay or similar material, to have some means of keeping out the water. The almost universal method is to use compressed air, the force of the air holding back the water. The exact pressure used depends upon the local conditions and—in tunnelling under a river, for instance—it increases as the depth of water above becomes greater. As the hole is dug it is enclosed in steel to hold back the walls—but at the face where men are excavating rock and mud, it is the compressed air that prevents water seeping in to flood the workings.

Working in Caissons

Compressed air is used in the same way for work in caissons, the air preventing the water oozing under the bottom of the hollow cylinder and reaching its natural level. To reach the working chamber or caisson, men have to pass through an air-lock—really a chamber with double doors in which the pressure of the air can be artificially increased or reduced. This chamber not only prevents the compressed air at the working face escaping when anyone enters or leaves, but also serves for "decompressing" the men when they leave the work.

The "Bends"

Men working in a chamber under compressed air are in much the same condition as a diver under the sea; the pressure corresponds with varying depths of the sea according to the number of pounds per square inch. They are liable to the same disease of the "bends" which claimed many victims until its cause was studied and a preventive discovered. When air under pressure is breathed, some of the nitrogen is forced into solution in the blood. So long as the man working remains under pressure, no harm is done; but immediately the pressure is reduced the nitrogen forms little bubbles in the blood. These bubbles are responsible for the excruciating pains of the "bends," and are often fatal if they travel to the brain. Some of the symptoms of the "bends" are very similar to those of drunkenness. Divers and men working under compressed air wear a metal disc stating this fact, and warning anyone who may find them, apparently hopelessly drunk, immediately to telephone their place of working. This is because the only cure for the "bends" is for the victim to be placed immediately under pressure again, and then to be slowly "decompressed." Unless this is done the victim is in grave danger of death or disablement.

Deep-sea Diving

As has been explained, when dealing with deep-sea diving the secret of the prevention of the "bends" is slow decompression, so that the dissolved nitrogen can escape slowly and naturally without causing pain. It is therefore now the universal rule that anyone who has been working under compressed air must sit for three-quarters of an hour or more in the decompression chamber—the time depending on the pressure he has been subjected to. While there he can smoke, talk or read — and he scarcely notices the gradual reduction of the pressure to normal. The diver achieves the same purpose by rising to the surface very slowly, pausing at the various knots in his diving rope for periods the length of which depend upon the depth to which he has been and the time he has been under. The entry into the pressure chamber is also made slowly to avoid discomfort and possibly danger. Much of this trouble is now avoided by the use of helium as a diluent.

Danger of Flood and Fire

Work under pressure is dangerous and exhausting; men are paid in accordance with the pressure. This is, perhaps, the only work in the world in which the shorter the hours the larger the pay. The higher the pressure, the shorter the hours of work. Under really high pressure, two hours' work a day would be the limit. Apart from "bends," the chief dangers of the work are those of flooding and fire. It may seem curious to talk about fire in works under many feet of water, but it arises from the concentration of oxygen in the air. A cigarette burns away very quickly, and a spark may cause a fire. The danger of flooding arises from the breakdown of the air-pumping

Showing how deep-sea diving is carried out by the diver from a diving bell.

apparatus, or the walls of the tunnel bursting. The pressure is carefully regulated to the conditions. If water is leaking in, the pressure is increased. If air is escaping into fissures of the ground and can be heard hissing, the pressure is reduced. If, however, there is a breakdown in the pressure, or a large volume of water is unexpectedly and suddenly encountered, it will flood the chamber, rising close to the top. Normally, it will not fill it, because the air becomes more and more compressed. On one occasion, during the building of the Forth Bridge, a caisson was accidentally flooded. Four inches of air remained at the top which the water could not overcome, and a workman managed to keep his mouth and nose in this air until the water could be pumped out. If a large fissure suddenly appears, the compressed air may escape so quickly that it blows up. It may take workmen, tools—and everything with it to the surface. On one or two occasions workmen have been blown up during work under a river, and have suddenly found themselves on the surface of the water, even being shot into the air by the force of the escaping air. The greatest danger to be faced under these circumstances is the sudden change of pressures and, as soon as they are rescued, the men have to be decompressed.

Curious Effects

Working under pressure gives men a large appetite, as might be supposed from the large amount of oxygen breathed. It produces other curious effects. When the first tunnel was being driven under the Thames during the last century, the directors of the undertaking determined to celebrate the meeting of the pilot tunnels with a luncheon under the Thames. The champagne served was, as they might have foreseen if they had thought it out, absolutely flat, since the external pressure of air retained the bubbles of gas. They drank it nevertheless. Then they left the tunnel, and the effect of the reduced pressure on the champagne they had swallowed can be guessed. An excellent lesson as to the importance of paying attention to every detail in accordance with the laws of science before they are pressed into the service of man. It is rare to find any technical problem which has not its ramifications in other branches of science than that to which it is first directed.

A Photographic Range-finder

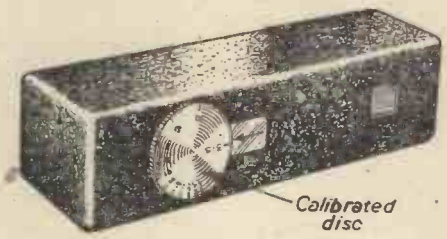
Constructional Details of a Useful Instrument for the Amateur Photographer

IN making this simple instrument the first part to take in hand is the casing, which is made in two pieces, from 14 or 16 gauge sheet brass. Mark out the shapes to the dimensions given in Fig. 1, and drill holes as indicated. Slightly score the metal along the dotted lines to assist bending. When cut and drilled, smooth with fine emery cloth, and bend to form a rectangular box (Fig. 2), all the joints of which must be neatly soldered.

Fitting the Mirrors

Next, take a piece of thin, good quality mirror (surface silvered if you can get it) and cut two pieces, one ¾in. by ¾in., and one ¾in. by 1 3/16in. Lay the larger piece, silvered side up, on a wad of paper, and with the corner of a piece of glass and a ruler, scrape parallel clear lines on the mirror, about 1/32in. wide and 1/32in. apart. This semi-silvered mirror is mounted inside the range-finder in the position shown in Fig. 3, and is held in place by two small brackets, "A" and "B," made from ¼in. by ½in. strips of sheet copper, bent to the shape shown. These brackets are soldered in place, and at the same time the baffle "C" is also soldered in position. The latter consists of a similar strip of copper, bent at 90 deg.

For the adjustable mirror holder, take a strip of springy steel or brass, 2½in. long by ½in. wide, and bend it as shown in Fig. 4. To the end marked "A," glue the smaller of the two mirrors so that its length lays along the length of the spring, and solder the end marked "B" to the inside of the range-finder at the point marked "X" in Fig. 1. (See also Fig. 5.) Then solder a small nut on the inside of the hole "H" (Fig. 3) and fit in it a short bolt, to the head of which is soldered an ½in. diameter brass or copper disc. This disc may have a milled edge, since it is the wheel by which the range-finder is operated; it also carries the scale which indicates the range.



The completed range-finder.

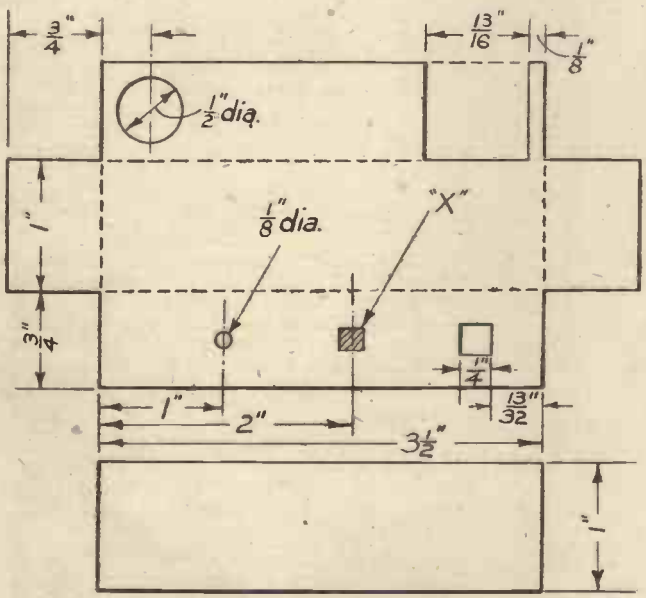


Fig. 1.—Developed blanks for forming the casing of the range-finder.

Testing

Lastly, paint the inside of the instrument with some matt black paint, after which it may be tested. Look through the hole "E" at some distant object, and cover the large hole in the front with a piece of black card. A bright picture should be seen as through a round hole, by reflection from both mirrors. On uncovering the large hole, it should be quite easy to see two superimposed images, most probably not in register; one as seen direct, and the second by double reflection from the two mirrors.

Calibrating

On turning the milled disc the two images will be seen to come together and finally coalesce. If the focusing is done on a distant object, the range-finder is then set at infinity, and by repeating the procedure on objects at known distances down to 3ft., the instrument is easily calibrated. The milled disc may be removed (by unscrewing) to have the calibrations engraved or etched in place; when the reading is taken against a fixed mark on the case.

When all is complete, the bottom is soldered on, and the range-finder finished by covering it with thin leather. If convenient it may be mounted on the camera itself; the exact method of fixing being left to the user. In use, focus on the eyes of human beings or animals or on the most prominent part of the picture.

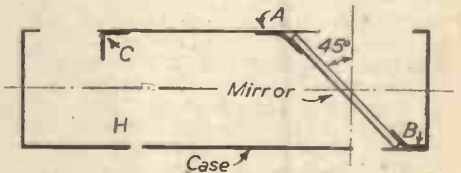


Fig. 3.—Section of casing with fixed mirror in position.

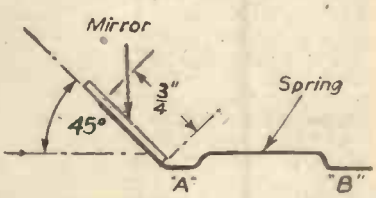


Fig. 4.—Details of the adjustable mirror holder.

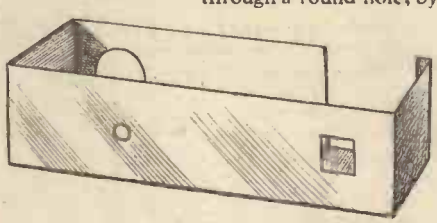


Fig. 2.—The sides and bottom of the casing bent to shape.

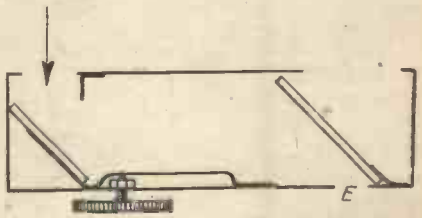


Fig. 5.—Section of range-finder, showing how adjustable mirror is operated.

Rotary Pneumatic Tools

Notes on Their Construction and Operation

IN external appearance a rotary pneumatic tool is very similar to a pneumatic percussive tool, and the chief difference internally is in the driving unit, which consists of a rotary air-motor. The following particulars concerning the driving unit for rotating tools, such as grinders and drills, apply equally to small air motors for such duties as driving fans, agitators and light conveyors.

Rotary Air Motor

Prior to the introduction of the modern "rotor" type air-motor, small reciprocating compressed-air engines were employed for rhe above-mentioned duties. Certain disadvantages attended their use, however, such as vibration, heavy wear, and consequent leakage with loss of efficiency. In addition, the outline of the tools was irregular owing to the cylinders, which were usually arranged in "V" formation. The rotor type, however, disposes of all these points, and is an extremely simple unit consisting only of a slotted rotor mounted eccentrically in a rotor case, or "stator" of larger diameter. From Fig. 1 it will be seen that a crescent-shaped space is left between the rotor and stator. Each slot in the rotor carries a sliding blade, which is free to move in and out of the slot. As compressed air is admitted to the crescent-shaped space, it acts upon blade "A" and so causes rotation of the rotor. When the following blade "B" passed the inlet port, the supply to the section between "A" and "B" is cut off, and the air expands, until it escapes to atmosphere as the exhaust port is uncovered by blade "A." It will be seen that the exhaust does not go direct to atmosphere after leaving the rotor case, but in the particular tool illustrated it is taken round passages on the inside of the drill body. Further expansion therefore takes place, and very effective exhaust silencing is thus obtained. Without such an arrangement, the exhaust noise from even small tools of this type can be very pronounced. When running, the blades are thrown outwards by centrifugal force, but to ensure that the motor will always be self-starting, the blades are forced outwards to the maximum point allowed by their position in stator by compressed air. The air reaches the bottom of the blade slots by way of holes drilled in the shaft.

This type of prime mover gives an extremely smooth-running tool with complete absence of vibration, and clean external lines.

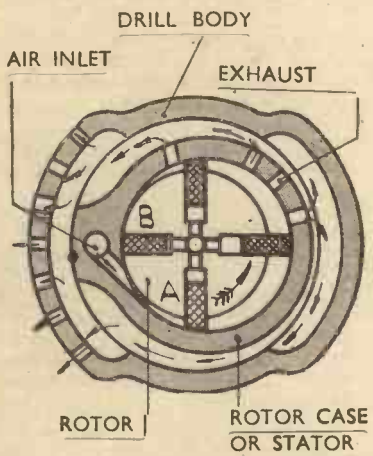


Fig. 1.—Section through a small rotary drill.

Multi-vane Drills

These drills are of simple construction throughout, and represent a great advance in drill design (see Fig. 5). A feature of these tools is their compact dimensions, and a very low weight-to-power ratio. Their high torque power is derived from a rotor air-motor fitted with four easily renewable blades. It is perfectly balanced and ensures silent and vibrationless operation. Other features of importance include stainless steel ball bearings and a simple twist grip throttle giving absolute control of speed, forward and reverse.

Speed Governor

In the case of the larger sizes of drills, where racing and consequent excessive air consumption would occur under light load conditions, a speed governor is provided. This precaution is also necessary in the case of grinders, as modern grinding wheels have a fairly critical "best cutting speed." Fig. 3 shows the centrifugal governor as used on hand grinders manufactured by Brown and Wade, Ltd. It is fitted at the end of the rotor shaft, and consists of steel balls carried in grooves on the "governor plate," and in contact with the "governor cone." A spring holds the governor valve and cone in the position shown until the desired r.p.m. is reached. The balls then fly outwards, and the cone and valve move axially to throttle the air supply and so hold the speed.

Fig. 2.—A "Broomwade" pneumatic trench pump.

This type of motor is used in all rotary tools made by the above firm. It is also employed in pneumatic shears, which are capable of cutting metal sheets up to 16 gauge at a speed of 12 feet per minute. In this type of tool the drive is taken through planetary gears which are identical with those used in the small drills, but the end of the slow speed shaft takes the form of a small crank of eccentric. This operates in a ball bearing fitted in the vertical shaft which carries the moving shear blade, so that when the motor rotates, it is given a reciprocating motion.

Trench Pump

Another very useful application is the trench pump. In this case a high impeller speed is, of course, required, and therefore the rotor is direct coupled to the impeller without the use of reduction gearing. The size illustrated handles 57 gallons per minute when discharging against a head of 50ft. and operating on compressed air at 85lb. per sq. in. pressure.

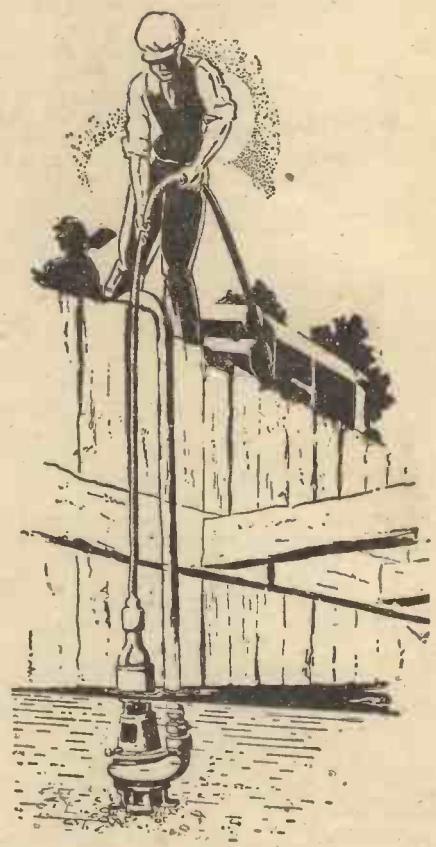


Fig. 4.—A pneumatic trench pump in use.

There are no complicated mechanical arrangements, and no working parts are exposed. The only wearing parts are four small, easily renewable blades, which are made of a special non-metallic material. The rotor is of stainless steel, and the pump is fitted with a water-lubricated bearing. The impeller is guarded by an efficient foot strainer, and is controlled by an automatic governor, which prevents racing and slip, and

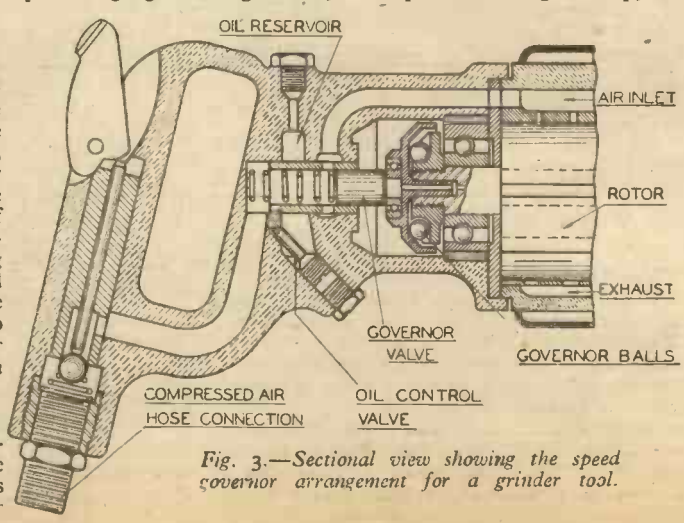


Fig. 3.—Sectional view showing the speed governor arrangement for a grinder tool.

maintains a steady pumping rate. A lubricator supplies oil to all working parts, and the unit requires neither priming nor attention. The pump is shown in operation in Fig. 4.

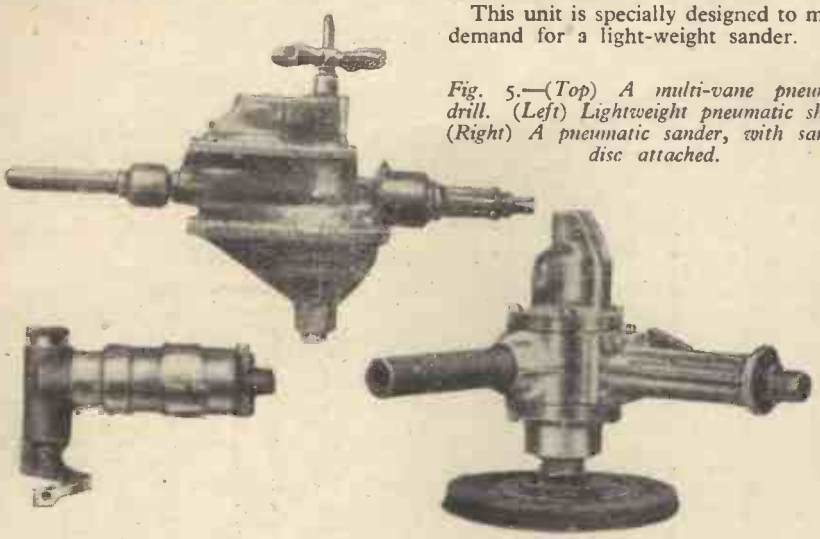


Fig. 5.—(Top) A multi-vane pneumatic drill. (Left) Lightweight pneumatic shears. (Right) A pneumatic sander, with sanding disc attached.

All that is necessary is to turn on the air before lowering the pump into the sump or trench.

Pneumatic Sander

This unit is specially designed to meet the demand for a light-weight sander. It is a fast production tool for rubbing down sheet metal, boat hulls and similar surfaces; also for polishing stainless steel and copper. The sanding discs are quickly detachable from the flexible pad. The maximum size of sanding disc is 7in., and the r.p.m. on load is 4,500. The motor uses 20 cubic feet of free air per minute at 80lb. pressure. An illustration of one of these tools with sanding disc attached is given in Fig. 5.

Shears

A typical example of lightweight pneumatic shears is also shown in Fig. 5. Of robust design, these shears are comfortable to handle, and can be operated continuously without fatigue to the operator. In use the fixed blade is beneath the metal to be cut. The operator has a clear view of the work, and can readily traverse the moving blade along a straight or curved line. The shears, which are capable of cutting to a radius of 1in., embody a planetary gear system, as previously mentioned, with nickel-chrome steel gears.

The information contained in this article, and the accompanying illustrations are reproduced by the courtesy of Broom and Wade, Ltd., High Wycombe, Bucks.

The World of Aviation

A.A. Rocket Barrage

GUNS are not the chief weapons now in use in the defence of ships against air attack. A new device which has been used for some time with considerable success is a special form of rocket apparatus which shoots into the sky parachutes from which long wires are trailed. Unless a pilot swerves to avoid these wires at once his 'plane is likely to become entangled in the wires and fall into the sea.

Some hint of the existence of this weapon was contained in an Italian report concerning operations in the Mediterranean in March, 1941. This described it in general terms as a projectile containing coils of steel wire capable of being thrown up to 20,000 ft., at which height the wires unwind to cover a radius of 150ft.

R.A.F. Fire Balloons

IT is reported that the German people have been warned against the dropping of incendiary balloons by the R.A.F. The balloons burst into flames several yards long on the slightest contact with the ground.

Sir W. Windham

SIR WALTER WINDHAM, aviation pioneer, died recently at his home at Builth Wells, at the age of 74. Sir Walter conceived the idea of the air mail in August, 1909, when he sent a letter from France to England, believed to be the first letter carried by air.

Sir Walter founded the Aeroplane Club in 1908, and offered a gold cup to the first man to fly the English Channel, the trophy being won by Bleriot in 1909. He took part in the first motor drive to Brighton.

10,000 Aircraft Sent Overseas

DURING an address at the opening of an exhibition of British war weapons at Washington recently, Lt.-Gen. G. N. Macready stated that Britain sent nearly 10,000 'planes and 1,000 tanks to overseas battlefields in 1941 alone.

These figures supplement those given by Mr. Churchill in the House of Commons recently. The Prime Minister stated that in two years Britain, the Empire, and the United States, had sent to the Middle East 4,500 tanks, 6,000 aircraft, nearly 5,000 pieces of artillery, 50,000 machine-guns, and more than 100,000 mechanical vehicles. Tanks sent to Russia numbered 2,000.

Tailless Fighter Came Home

ALTHOUGH the tail of his Hurricane bomber was torn to pieces by the propeller of another aircraft (possibly a F.W. 190), during fighting over France recently, a warrant officer pilot went on to bomb his target before turning for base.

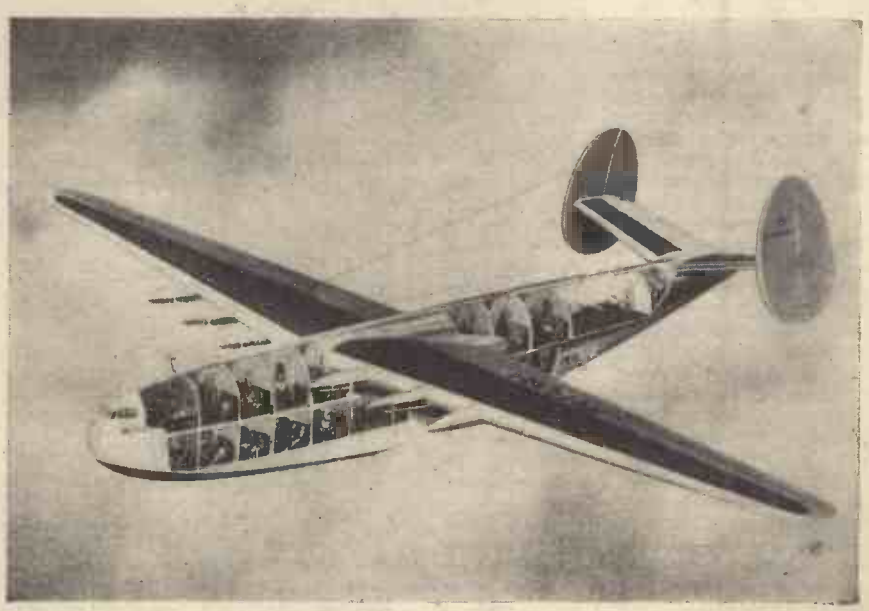
"Ta-ta for now, I'm going home," he had called over the radio-telephone. Though he could not climb above 300ft., he reached his base after an 85 miles crossing and made a perfect landing at speed.

"I bet that shook you, sir," he said to the astonished C.O., who had watched him come in. Then it was the pilot's turn to be shaken—when he saw the state of his aircraft's tail.

The squadron engineer officer examined the aircraft and commented: "I still can't believe it. It would take the strength of two mules to fly the machine with the controls in that state."

New Method of Spotting U-Boats

A NEW method of spotting enemy submarines has been devised by a flying officer of Coastal Command. He was so disappointed over the difficulty of detecting and destroying U-boats that he made a study of all possible methods. The technique he evolved gave immediate results, and on the first night it was employed he spotted two submarines. In one month he attacked no fewer than four, the only four to be sighted by the whole command. He is now instructing his colleagues.



New design for a commercial six-engined aeroplane capable of carrying 102 passengers, each with 80 pounds of luggage, plus 25,000 lbs. of mail and cargo from the United States to London in 13 hours.

Transporting Logs

A Loggers' Camp, and How Logs are Transported from the Forest to the Mills

CONDITIONS have altered greatly since the days when the Canadian lumberjacks went out into the forests in a more or less haphazard fashion to fell the giant trees to supply the world with timber. To-day, logging is a highly organised business and employs thousands of men of all sorts and classes. There are skilled specialists, trained in the logging business, and unskilled workers who are representatives of various trades.

Fig. 1.—(Above) Loggers riding the logs into the river current towards the mill.

Fig. 2.—(Right) One by one the logs are hauled up the sluice into the mill.

"Booming Grounds"

After a suitable large tract of "tall timber" has been located near one of the great river valleys, it is opened up by the construction of roads and railways, and plans are prepared for the "booming grounds" where the logs will float while being sorted and graded ready for the saw mills. Huge camps then spring up, water is laid on, electric light provided, and machinery and material have to be transported into rough mountainous country, which is probably miles from the nearest railway station.

In the camp the comfort of the men is a first consideration, and everything, including the catering, is run in a businesslike manner. The post office and general store is another man's job, and at this latter place one can usually purchase anything from a morning paper to a suit of overalls.

Many more men are engaged in the logging camps in summer than in winter, for their services are required to fight the ever-present danger of fire. It is interesting to note that in this employment they are known as "fire-spotters," and are organised under a fire warden. These men usually take no part in the logging operations, but, armed with shovels, they patrol allotted areas to see that no spark from the locomotives or donkey-engines, falling on the wood shavings and other debris inseparable from logging operations, starts a fire. Such fires, if not immediately extinguished, may quickly become raging conflagrations, destroying property and material worth hundreds of thousands of pounds, with possibly loss of life in addition. When a bad fire does occur, every man in the camp has to turn out and fight the fire for all he is worth.

From Forest to Mill

In the accompanying illustrations various phases of a log drive in the backwoods of Maine are shown. Fig. 1 shows the loggers, known as "Logs," riding the logs from the "mill pond" into the river current towards the mill, which is situated four miles away from this point. The men use "cantdogs," long poles with a special form of hooked end, to push the timber into the stream and to prevent a possible jam. The loggers are expert at this work—they have to be, because one slip and they would fall into the icy water.

Flumes, consisting of shallow wooden troughs with running water, run for miles through the mountains, and are used for bringing the logs down at a rapid rate to the "mill pond."

After reaching the saw-mill the logs are hauled up the sluice into the mill for cutting into lumber (Fig. 2). At this point the logs have travelled about 50 miles of turbulent river, and will finally be converted into materials for defence purposes — ships, army camp construction, boxes for shipping shells and other materials overseas, and into pulp.

When the timber is used for making pulp for paper, it is sawn into suitable lengths and conveyed to the pulp mill in railroad trucks. The illustration, Fig. 3, shows a trainload of pulp wood arriving at a mill at Whitneyville, Maine, and the logs have come from this year's log drive on the Machias River.

Fig. 3.—(Below) A trainload of pulp wood arriving at the mill, where it will be converted into various kinds of paper.

NEW SERIES

Odd Jobs in House and Garden

5.—Erecting Clothes Posts, Making Bird Houses, Rustic Woodwork

By "HANDYMAN"

Fig. 2.—A simple house for small birds.

CLOTHES posts are often fixed permanently in a suitable position in the garden, but a much better method is to make them removable, so that they can be stowed away, out of sight, when not required. This can be done by supporting the lower ends of the posts in wooden sockets, sunk in the ground.

Making the Sockets

The posts should be 4in. square and about 8ft. 6in. long, which allows for 2ft. of the lower end to be supported in the socket. The socket can be made with boards ⅞in. thick, nailed together, as shown at A, Fig. 1. The narrower sides are let in from the edges of the wider pieces to avoid splitting the wood when nailing the parts together. The base of the socket, cut to the dimensions indicated, is nailed in place. Before nailing the sides of the socket together, make sure that sufficient clearance is allowed to enable the post easily to slide in and out.

After digging the hole the required depth for the box, place a few layers of large stones at the bottom of the hole, for drainage purposes as at B. Before the socket is sunk in the ground it should be well coated with creosote, inside and outside, and allowed to thoroughly dry. When ramming the earth down all round the socket, place the post in position, and make sure that it is vertical when the ramming is completed. The top of the socket should project about 2in. above ground level, and to prevent earth or rain from entering, when the post is not in use, a wooden cover can be fitted. This is easily made with two pieces of wood, as indicated at C.

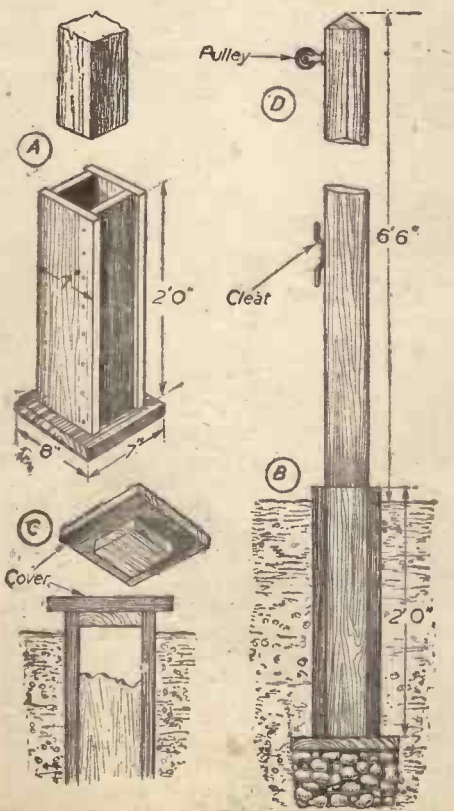


Fig. 1.—A method of fitting sockets for removable clothes posts.

Pulley and Cleat

Many clothes posts are provided with round pegs at the top for holding the clothes line, but if the fitting of a new post is contemplated a better method is to dispense with the pegs, and screw into the top of the post a fixed galvanised pulley, as at D, to take the line, the end of which can be held fast by a cleat, screwed to the post the same side as the pulley, and at a convenient height from the ground.

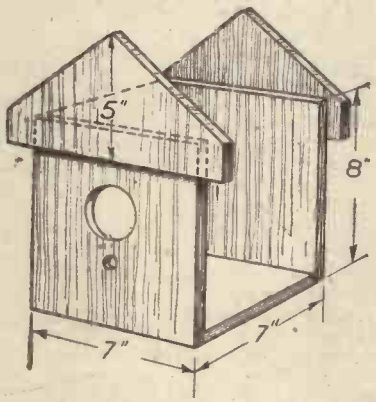


Fig. 3.—Details of parts for the house shown in Fig. 2.

Bird Houses

Bird houses and shelters, for attracting small wild birds, such as robins, blue tits and finches, can easily be constructed from odd pieces of wood. Two simple houses are shown in Figs. 2 and 4, the first being intended to hang from the branch of a tree, while the other could be supported on a nail driven into a tree trunk. Any kind of unplaned wood can be used, and an ordinary box or packing-case should provide the necessary material.

Mark out the parts, to the dimensions given in Figs. 3 and 5 and after sawing, roughly trim the edges. A single opening, not more than 2in. diameter is made in the front of each house, and just below each opening make a ⅜in. hole and push in a 4in. length of dowel rod for the perches. In nailing the parts of the first box together, note how the gable pieces are placed.

For the roof cut six pieces of ⅜in. wood, 10in. long and 3in. wide, and nail them in place so that they overlap, weatherboard fashion.

Hinged Roof

It will be noticed that the top of the other house slopes from back to front, the top edges of the sides, back and front being finished flush so that the roof will lie flat. The roof, which can be formed from a single piece of wood, has two strips, 1½in. wide, nailed on underneath, two holes being bored in the front ends to take screws for fixing to the sides of the house. This allows the roof to be easily raised for cleaning out the house.

The houses can be painted, or treated with creosote, and should be allowed to thoroughly dry before being put in their places in the garden.

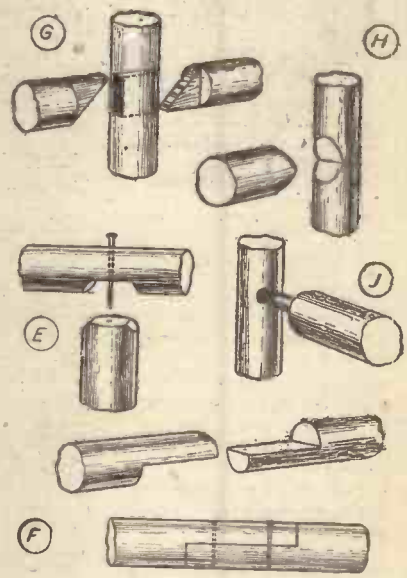
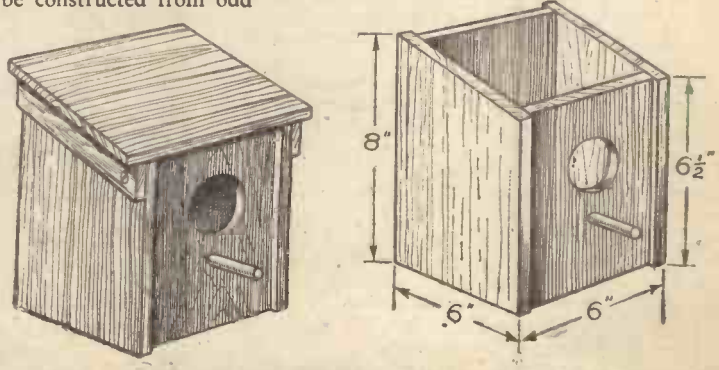


Fig. 6.—Various rustic woodwork joints.



Figs. 4 and 5.—A small bird house with hinged top and details of parts for making it.

Rustic Woodwork

Garden rustic woodwork, including pergolas, rose arches, etc., will last much longer if properly erected, and the joints correctly made. All posts that stand 6ft. or more above the ground should have the ends sunk at least 1ft. 6in. in the ground. The buried ends of the posts should be stripped of bark, and coated with hot tar.

When erecting a rose arch it is usually sufficient to sink the ends of the posts in holes in the ground, and simply ram the earth down round them. With tall pergolas, however, it is best to bed each post firmly on a piece of flat stone, laid on the bottom of the hole, and then ram round firmly with large stones and earth, as shown in Fig. 7.

Various Joints

The top rails can be joined to uprights by a simple notched joint, as at E, Fig. 6. If the parts are cut to fit snugly together a durable joint will result. A single nail can be used for fixing. For joining the ends of two poles together, either at right-angles or in alignment, a halving joint, cut as shown at F, can be used. Two nails are used for fixing, as indicated.

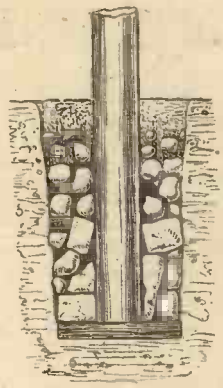


Fig. 7.—When erecting tall pergolas in rustic woodwork the base of each post should be sunk in the ground to a depth of at least 1ft. 6in. and well rammed round with earth and stones.

In cases where the ends of two horizontal rails have to be joined, in alignment, to a common upright post, a sound joint can be made by tenoning the rails into a mortise cut in the post, as at G.

When fixing one end of a horizontal rail to a post, a simple notched joint can be used, as at H, or, alternatively, a neat joint can be made by dowelling the ends of the rails to the posts, as at J, the ends of the rails being first shaped to fit the curvature of the upright.

When nailing rustic woodwork do not drive the nails right in with the hammer alone, but use a nail punch to avoid splitting or bruising the bark.

After being exposed to the weather for a number of years rustic work tends to shed its bark, and for this reason the bark is sometimes stripped off the posts before erection, and the wood underneath given a couple of coats of varnish.

Pneumatic Wood Conveyor

How Sawdust and Shavings are Collected in a Modern Woodwork Factory

MOST amateur carpenters know how quickly sawdust and shavings mount up. It is a difficult job keeping a small workshop clean; but much more so in a large factory. One factory, for instance, turns out over *two tons* of waste every hour, and to remove this manually would require a small army of sweepers.

For some years now a rather interesting method has been in use, known as pneumatic conveying.

The principle behind this is much the same as that of an ordinary vacuum cleaner.

Most woodworking machines throw off their waste at one particular point. Take the circular saw, for example. The blade rotates so that the teeth come down on top of the wood being sawn. Naturally, most of the sawdust is thrown off underneath the machine, so a sheet metal casing is built round the underside of the blade, and all the sawdust falls into it. This casing is connected by means of a tube to a special fan which is started up and draws air in at the rate of 6,000ft. per minute. In more familiar terms, that means 69 m.p.h., and at such a speed, sawdust is whisked away almost before it can be sawn.

That briefly is the principle of pneumatic conveying. It may not sound particularly difficult, but that isn't the whole story. To meet the present demand for fuel economy, many factories are investigating the possibilities of using wood in place of coal, so the modern system of conveying has developed into a complicated arrangement of machinery for collecting and utilising wood.

A large factory may have a hundred or more machines to deal with, and they are usually laid down along both sides of the shop, with wide gangways in between. The suction pipe from each machine is carried up into the roof, to a horizontal metal duct, which holds the waste from all the machines, and may be anything up to 4ft. diameter. The individual pipes are about 6in. diameter.

Fans

Some idea of the problems involved will be gathered from the particulars just mentioned. The engineer who designed that system had to get rid of two tons every hour, or nearly 16 tons every day. Now, to carry one pound of wood, 40 *cubic feet* of air are needed. A simple mathematical calculation shows the amount of air involved.

All this air and wood has to pass through the fan, so something special in the way of fans is indicated. It not only has to supply sufficient energy to draw the air through the ducts at a high velocity, but the blades have to be so designed that they do not clog with sawdust. The size of the fan is also critical. If it is too large, it will be uneconomical to run; on the other hand, a small fan will not be able to draw the sawdust and shavings away quickly enough, and the whole factory would come to a standstill. Fortunately, there is a happy medium.

Dust Separators

After leaving the fan, the waste has to be collected, and a rather fascinating piece of apparatus is used for this purpose. At first glance it appears to be doing the impossible.

Imagine a large inverted cone; something like an inverted ice cream cornet. Air and sawdust are blown in near the top, and the mixture travels round and the air spirals out at the top, *but the dust falls to the bottom.*

For the inquisitive, it may be pointed out that the sawdust only remains suspended in the air because of the great velocity. Consequently, if the velocity decreases, a point will be reached where the wood ceases to be carried along. This is exactly what happens in the separator. The diameter of the inlet tube is much less than that of the separator itself; so the velocity decreases and the sawdust falls to the bottom.

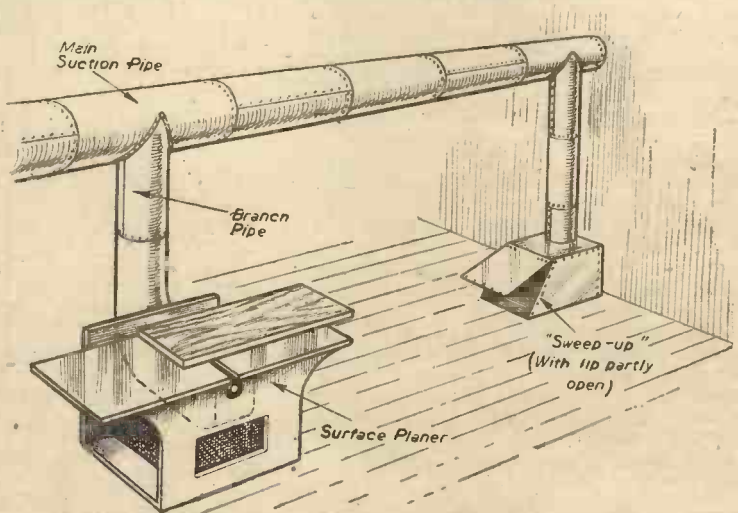
With these aptly named "Cyclone" separators, waste can be dumped just where it is wanted. The engineer now has the waste from all over the factory collected in one place. What happens to it now?

Saves Coal

Some factories sell it, and this is probably the best plan where the quantity is small. But others use it instead of coal for supplying heat, light, and power, and many works to-day are doing this. Not only is the factory heated and lighted, but the machines are driven by the waste they themselves are producing!

Theoretically, one pound of wood has half the potential heat of one pound of coal. Owing to a number of factors, the chief of which is the moisture content, it is usual to estimate that four times as much wood is needed.

To discover the possibilities of any plant, heating engineers first calculate the amount of coal needed to heat the factory, and then check up to see if there is any chance of sufficient wood being available.

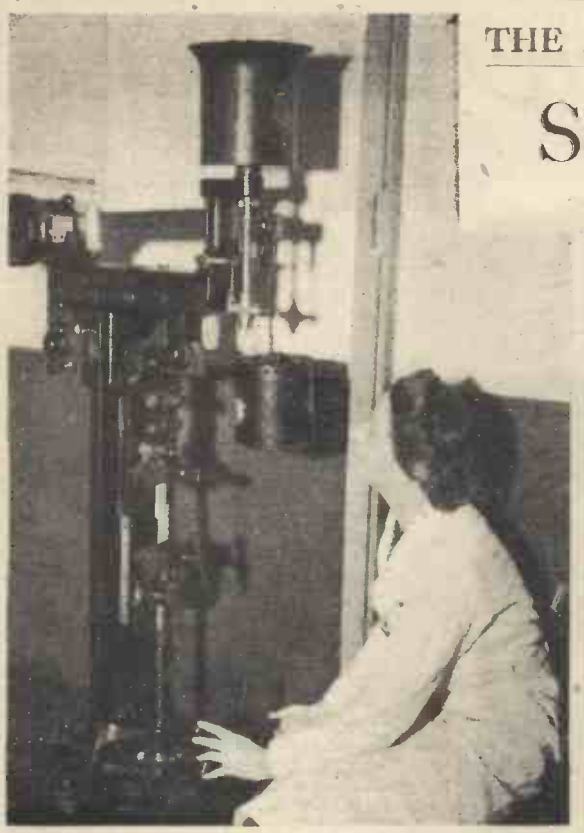


A corner of a woodwork factory showing the overhead suction pipe for extracting sawdust and shavings.

Burning Sawdust

Burning sawdust is rather a different proposition to burning coal. It cannot just be shovelled on in the usual way, and there is a danger that the ordinary type of boiler would get choked up. The most successful method is to blow it into a brick furnace by means of a fan. There it is burnt and the hot gases given off led away to the boiler.

Even when it has been burned, the useful life of wood has not ended, as the ash can be collected and used as a fertiliser.



A chemist making a test of the finished glue. Lead shot is poured into a container until the breaking point is reached, which in this instance was 1,060 lb. per inch. Further particulars are given in the paragraph below.

THE MONTH IN THE WORLD OF

Science and Invention

Any Old Bones?

WHEN you and the dogs have finished with a bone, hand it out for salvage —because its usefulness has only just begun.

Great Britain imports thousands of tons of bones every year from such far distant countries as Africa, South America, India and Egypt, and the shipping space is urgently required in these times for the war effort. If every household in Great Britain saved at least two ounces of bones a week, it would provide a total of about 44,000 tons a year. Every bit of a bone can be used and is needed for commodities that are of vital importance in these times. Bones passed through the factories in this country are sufficient to provide enough glycerine for cordite to fire ten million shells. Vast machinery is needed to extract all the valuable by-products from them. They are fed into boiling fat, and all the glutinous matter extracted. Glue is needed for the making of aircraft and ships; in shell cases and fuses; in the manufacture of fire-resisting and camouflage paints. It is also used in the production of thousands of miles of A.R.P. gummed tape, in the making of fertilisers —and for many other purposes such as match-making, paper-making, linoleums, joinery and box-making.

Robot Cabbage Planter

A DEVICE now making its appearance for the first time is a power-operated cabbage planter. The machine possesses a mechanical pair of fingers, and makes a perfect job of planting cabbages at the rate of 150 plants a minute. Other agricultural contrivances are a machine for setting potatoes at the rate of 22 yards a minute, and a machine for planting sugar beet seed.

Frocks Made of Glass

IT is reported that nylon and glass fibres will replace cotton in many Lancashire spinning mills and weaving sheds, when the war is over. Women will wear dresses made from glass, while nylon and other fabrics produced and perfected during the war years will be used on a wide scale. The shape of fashions to come is to be seen at a Cotton Board Exhibition now open in Manchester which shows the strides made by the American textile industry since the war began. The exhibits include samples of cotton and rayon dress fabrics, indistinguishable from real silk and expensive fabrics, cloths adapted for war purposes, furnishing fabrics, cotton stockings of a type as attractive as pure silk, articles made from America's latest discovery, nylon, and patterns of dress materials made from glass fibres.

Sawdust Tyres

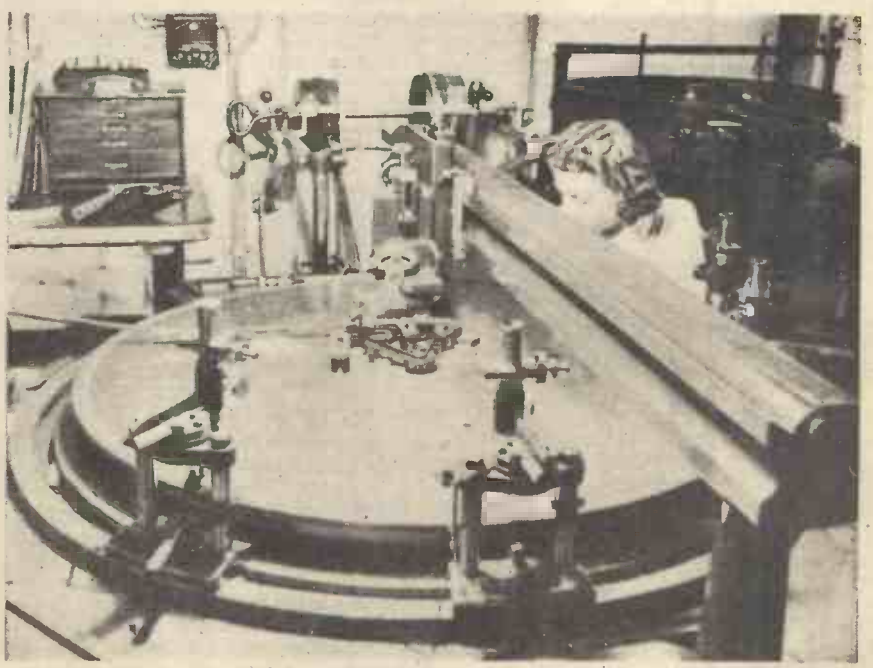
HARRY JOHNSON, a Massachusetts chauffeur, has discovered a method of making sawdust tyres, by pouring oil into sawdust-filled sections of a wooden car tyre he has invented. The tyre is made up of eight sections held together by wooden pegs. Oil is used to keep the wood moist and resilient.

New Shellac Creosote Cement

THE British Scientific Instrument Research Association have developed in their laboratories a new shellac creosote cement, which is more adhesive and less brittle than similar cements, and does not become infusible by repeated heating. The composition is: superfine shellac, 50 grams; wood creosote, 5 grams; terpineol, 2 grams; and ammonia, 1 gram. The ammonia, terpineol and creosote are added to the shellac and the mixture gently heated until fused, stirring well, after which it may be moulded into sticks. For making joints between metal and glass or similar materials, the surface to be joined should be cleaned and warmed before the cement is applied. The cement must be fused as needed.

New U-boat Engine

ACCORDING to a technical expert who has visited submarine bases in Germany, the Germans have invented a new motor for their U-boats which can propel the submarines both on the surface and under the sea. Previously, submarines have needed a Diesel engine for the surface and electric motors for the dive. The new system eliminates the heavy, noisy Diesels and the cumbersome accumulators, which are sometimes a sixth of the submarine's total weight. Tests of the new motor have proved very successful and it is now in service. By prolonged tests on small submarines, engineers have overcome its outstanding inconvenience, namely, heat emanations during underwater movement. The technicians found means of equipping big submarines with apparatus for producing gas, ensuring a vast radius of action either above, or below the surface. Reservoirs are charged with hydrogen and oxygen under pressure, whilst the submarine is at its home base. Long cruises are made possible by another invention which enables these gases to be manufactured in the submarine. Among the advantages of the new system are reduction in weight, greater power production and power reserve in case of danger, and simplification. It also enables more rapid diving, greater space, lower temperature below surface and easier control, while vast quantities of Diesel oil are saved.



A very high degree of accuracy is essential in the making, assembly and testing of navigational instruments. The illustration shows the scale on a sextant being divided and marked, a process demanding great skill and precision.

MASTERS OF MECHANICS

No. 77.—George Eastman, Roll-film Inventor and Pioneer of Popular Photography

PREVIOUS to the entry of George Eastman into the photographic world, picture-making by photography was a cumbersome and a laborious business. Miniature cameras, although they had been invented, were never used, for the reason that the sensitive glass plate had to be prepared immediately before it was exposed in the camera. The plate had also to be exposed actually in the wet state. What is more, it was then necessary, for successful photography, to withdraw the plate from the camera immediately after it had been exposed, and before it had had time to dry off, and then at once to develop it in this wet condition.

Cumbersome Equipment

The consequence of this rather formidable array of requirements for photographic success was that it was common for photographers, both amateur and professional, to go about the country with plate-sensitising and developing equipment which, together with the large wooden stand-camera which was then popular, weighed anything from 56lb. to a hundredweight, and even more. A photographer in those days had to take a portable laboratory about with him. Under the name of the "dark tent," this latter equipment comprised plate-coating, sensitising, developing and fixing chemicals, a water supply and sometimes a portable form of oil lamp, to say nothing of various other more or less indispensable articles for the job. No wonder was it, therefore, that, in those now distant days, the ardent amateur photographer had to be an individual of unbounded and unquenchable enthusiasm and determination, as well as being the possessor of considerable means.

Within the space of a few short years, however, much of the former unavoidable labour, trouble and mess was removed from the sphere of photography through the cleverness of a young bank clerk whose enthusiasm for photographic experiment made him eventually throw up a safe job rather than abandon his work for the advancement of photography. His name was George Eastman, who in after years became world-known in association with the Eastman Kodak Company, of Rochester, U.S.A.

George Eastman was born at Waterville, near Rochester, New York, on July 12th, 1854. His father was the proprietor of a small business college, but Eastman senior died young, leaving his widow with her son George to support. The business college eventually failed, but when this occurred George was 14 years of age, and he had received an education at the local secondary school at Rochester.

George Eastman, after obtaining one or two jobs and not finding them to his liking, succeeded in securing a post of junior clerk

George Eastman.

in a Rochester bank. The work was interesting and the job was a steady one, and for a time young George Eastman jogged along contentedly in this occupation.

Eventually, however, he grew tired of his jog-trot existence upon a poor salary, and there sprang up within him an ambition to make money, and to be a man of affluence like many of the bank's clients whose accounts he totted up daily. But you can never make real money by being in an employed job, reasoned Eastman. To be wealthy you must have a successful business of your own in which you can employ others. And to build up a successful business you must produce some article having a wide appeal to the public.

One summer, young Eastman planned to go to the West Indies for a brief holiday. He wanted to take photographs there, for at this time he had become an enthusiastic and a skilled amateur photographer. But the task of transporting a heavy camera and its necessary "dark tent" equipment hardly appealed to the young man. The whole business was far too formidable for the average non-professional photographer.

Simplifying Photography

But why should not photography be simplified, mused Eastman. Why should not this art, science and pastime be made available to the masses of intelligent people, who, he felt sure, would jump at the idea of being able to produce photographic pictures for themselves by some easy means?

In a flash Eastman saw his life's career before him. "Why shouldn't I find a way of taking pictures which does away with half the work?" he reasoned.

Straightaway he began his experiments. A new notion had been conceived in Eastman's mind. He would try to produce plates which could be exposed in the dry state and developed after the photographer had returned home, thereby obviating the necessity for the irksome "dark tent" method of taking photographs, by means of the then universal wet-plate technique.

George Eastman began his experiments in a kitchen sink. Night after night, after he had come home from the bank, he would work away at devising various formulæ for the preparation of a photographic plate emulsion which could be exposed in the dry condition. At last, after two years' hard work, he succeeded in his quest, and devised a satisfactory formula for producing a dry-plate.

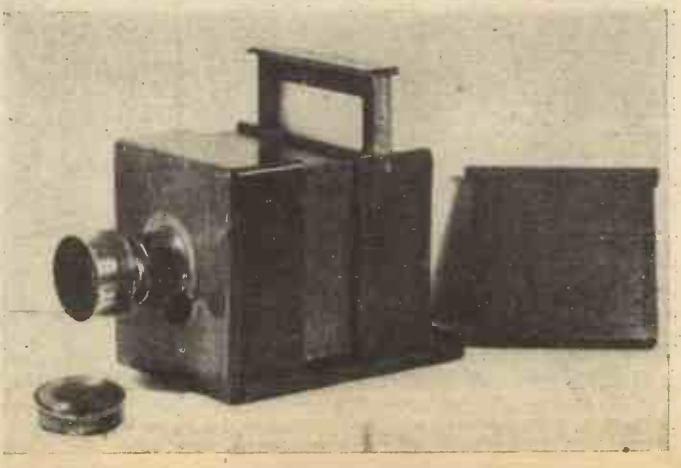
It is often stated that Eastman was the actual inventor of the dry-plate, but this is incorrect. The dry-plate's original inventor was an Englishman, a Dr. Maddox, of Southampton, who, in the early '70's of the last century, first produced a dry-plate containing a gelatine emulsion. Dry-plates were being manufactured in England at the time of Eastman's experiments, although their performance was poor, and the wet-plate method of photography was still overwhelmingly favoured.

Nevertheless, Eastman's dry-plates were the first of their kind to be introduced in America. The first "factory" to be set up by George Eastman comprised a room over a shop. Eastman employed an assistant, and, after leaving the bank in the evenings, he made it his practise to rush straight to his "factory," there to prepare his new "dry" emulsion which was applied to the plate on the following day by the assistant.

Emulsion Making

The job of emulsion-making was a tedious and a dirty one. The chemicals stained Eastman's hands dreadfully. So much so,

(Left) The heavy "dark tent," or portable dark-room, which had to be carried about by photographers in pre-film days of wet-plate photography. This particular example weighs 32lb.



(Right) An amateur's camera of the 1860's. Heavy and cumbersome, it necessitated the use of wet plates. It was entirely without shutter mechanism.

in fact, that one day the bank manager gave him a stiff lecture about his stained fingernails and told him that unless he gave up his photographic experiments and turned up every day with clean hands, he would have to relinquish the service of the bank. He saw in his tiny photographic business the chance of a lifetime, so, taking the plunge, he resigned from the bank, and at once entered upon the whole-time occupation of photographic dry-plate manufacturer.

A New York photographic dealer who happened to get into touch with George Eastman soon after, was impressed by the properties of Eastman's gelatine plates, and gave him an order for a definite number of plates to be delivered monthly. This commission helped Eastman on enormously and, for some months, the embryo business went on well.

Automatic Plate-coating Machine

Eastman invented a machine for coating his plates with the gelatine emulsion. This was one of the world's first automatic plate-coating machine inventions, the forerunner of the more complicated ones to come.

Suddenly, failure began to stare Eastman in the face. For no apparent reason, his plates "went off"! The plates which he had sold to dealers were all returned to him, complaint being made that they were all fogged. This was the first notion that Eastman had of his plates being perishable, and of their being unable to keep in good condition for long. Although it meant the almost total ruin of his business, he took back every plate which he had sold during the previous few months and refunded every penny paid on them. At the end of it all he had hardly a dollar left to start up again in plate manufacturing.

However, by dint of taking a partner into the business, Eastman weathered the storm and, once again, began manufacturing his dry-plates and selling them to dealers and to the public generally.

Business boomed for Eastman. His plates became more and more known by the public and their reputation began to increase. Then, like a lightning stroke, another tragedy threatened itself. For no apparent reason, his plates suddenly refused to work. The young manufacturer spent nights and days together in frantic experiments to find out the cause of their failure, but all to no effect.

Visit to England

One week Eastman decided upon a desperate measure. He closed his miniature factory down and took ship for England. Arrived in this country, he straightaway went to a firm which was then manufacturing dry plates, and persuaded the firm's principals to sell him their formula for use in America. Eastman's quest was successful. He returned to the United States with his newly-acquired formula and again commenced successful plate-making.

Eastman eventually found that the cause of the mysterious refusal of his plates to function was due to his use of a new delivery of gelatine, his original stock having been all used up. The new gelatine was highly refined material, and, as was afterwards discovered, it lacked traces of a sulphur-containing impurity which was essential for the conferring of light-sensitivity on the emulsion.

After this event Eastman had little further trouble with his plates. They sold steadily and they brought him in a satisfactory income.

The First "Kodak"

Eastman, however, was still convinced that photography had not been satisfactorily simplified for the amateur. He invented a camera and made for it a "film" composed of tough paper upon which his plate emulsion was coated. The camera was of a convenient box form and when loaded with its paper "film" it weighed far less than the then prevalent massive thick mahogany cameras which utilised glass plates.

George Eastman deliberated long and carefully over the name which he should apply to his newly-devised camera. He wanted a name which would be at once short, striking, characteristic, and easy to pronounce in all languages. Ultimately, he coined the word "KODAK" to designate his new camera, and in 1888 the original "No. 1" Kodak camera, with its paper film, was marketed in Rochester.

This prototype of to-day's amateur film cameras took circular pictures of 2½in. in diameter. Its capacity was one spool of no fewer than a hundred pictures!

An amateur's photograph taken on glass by the wet-plate process in the 70's. Note the elaborate gilt frame.

In 1892 the Eastman Kodak Company, of Rochester, came into being, with George Eastman at the head of it. The latter now planned to manufacture his Kodaks by semi-mass-production methods, and to market them all over the world. There was, however, one thing which was unsatisfactory about them—the paper film. Paper was by no means a suitable base material for coating a sensitive emulsion.

Eastman had the idea of making a transparent film for this purpose, and he is said to have invented (in conjunction with Edison) the perfectly clear, transparent celluloid film which Edison later employed to such good effect in his early cinematographs. Eastman's claim to the original invention of the celluloid film is disputed, however. Be this as it may, he certainly perfected the film and applied it to photography in a highly successful manner, so much so that by this single application of an original idea, he at once made possible the modern huge amateur film camera industry, to say nothing of the present-day colossal moving-picture trade.

Eastman's main occupations in the last decade of the nineteenth century were concerned with the devising of suitable plant for manufacturing his films, plates and cameras. As far back as 1891 he patented the "day-light loading" system for film cameras, with its accompaniment of developing tank technique, but, curiously enough this dual invention was not commercialised until 1902—eleven years later.

Introduction of Folding Cameras

After the success of the original box camera Kodak models, Eastman introduced the folding type of camera in 1898. Miniature folding cameras had been made before, but these had been nothing like Eastman's models, which were marvels of simplicity and mechanical and photographic efficiency.

During the early years of the present century, Eastman went from one improvement to another in connection with his cameras. It had been his aim to popularise photography in all civilised countries, and he now had the immense satisfaction of realising this ambition. Incidentally, he had also "made money" for himself.

New camera lenses were introduced by the Eastman Company at Rochester, and improved cameras were continually forthcoming. Film-coating methods were made more and more efficient, thereby cheapening the cost of photographic material for amateur use.

At the beginning of the last war (in 1914) George Eastman introduced the "Autographic" Kodak. A few years after that war's conclusion, he came out with the cine-Kodak (in 1923), whilst in 1928, the Eastman "Koda-colour" system of moving-picture photography was introduced.

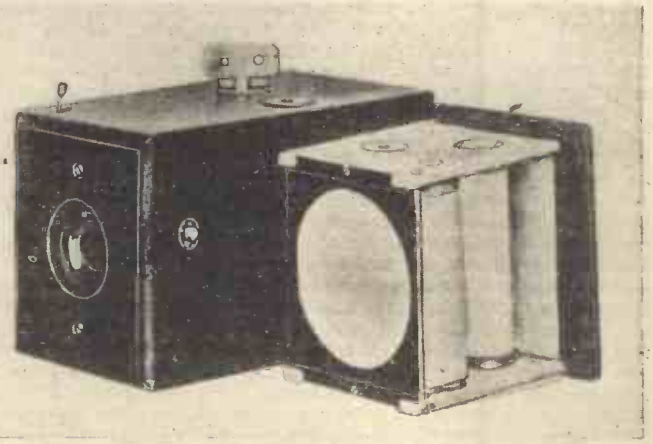
After his initial manufacturing business had been founded, George Eastman, throughout a long and a particularly active career, went from success to success. Everything he touched seemed to yield up more quotas of success to him. He gave the civilised world what it wanted—cheap, simple and interesting amateur picture-making, and, in return, the world made him almost fabulously wealthy.

During his later years, Eastman gave much of his wealth away in philanthropic measures. His total benefactions are said to have exceeded a hundred million dollars, half of which was received by the University of Rochester, U.S.A. In this latter town he founded an Orchestra and a School of Music, whilst in towns as far apart as London, Rome, Paris and Stockholm, he established important dental clinics.

Tragedy

Yet, in spite of his long, successful and courageous career, Eastman does not seem finally to have acquired a contented philosophy. His life ended in tragedy, for on March 14th, 1932, he cut short his existence by his own hand, leaving behind a mere scribbled note, as laconic and mysterious as it was brief—"*My work is done. Why wait?*"

George Eastman may well be said to be the pioneer of the people's photography, for he did more to popularise photography than anyone else had ever done.



The first Kodak. This pioneer of roll-film cameras took a 100-exposure paper film, and produced 2½in. diameter pictures.

A Low-tension Charging Station

Completing the Circuit : Rectifiers in Parallel : A Two-circuit Board : Making a Hot-wire Ammeter

By L. O. SPARKS

(*Concluded from page 299, July issue.*)

THE resistance R in Fig. 3 (July issue), has a value of 1 ohm—with the specified rectifier—and this can be provided by 5ft. of 20 S.W.G. Eureka resistance wire. To form the resistance element, wind the wire round a small diameter rod, say ⅛in., or ¼in. diameter or, if nothing better is available, a pencil will do. When a spiral has been formed, bend it to a semi-circular shape and secure the ends to two terminals or soldering tags mounted on a strip of fibre or ebonite, as shown in Fig. 9. The strip

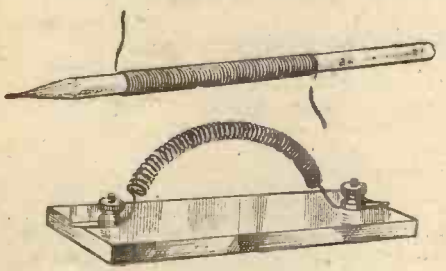


Fig. 9.—The resistor R can be made from eureka wire in the manner shown here.

can then be fixed in a convenient position between the positive D.C. tag on the rectifier and the positive output terminal.

When wiring the board, use fairly heavy gauge wire on the D.C. side and make sure that all connections are electrically sound. A poor or loose connection can cause a lot of trouble.

Increasing the Output

If two identical rectifiers of the types mentioned are available, the current output can be increased by connecting them in parallel. For example, if two L.T. 10's are wired in this manner, the maximum charging current will be 1.5 times that of a single one, i.e., 3 amps. If L.T. 11's are used, the current can be increased to 6 amps, and using A 4's to 3 amps. The circuit wiring is shown in Fig. 10.

The A.C. input to the rectifiers must be increased by 50 per cent. as regards current, but the voltage requirements will be the same as for a single unit. The only alteration to the secondary winding will be a heavier gauge wire, say, 18 S.W.G., for the L.T. 10's and A 4's, and 16 S.W.G. for the L.T. 11's. While speaking about the secondary winding, I specified 22 S.W.G. for the secondary; this has, in fact, been used for the work under consideration on a transformer for a considerable time, but it is cutting things a little fine if one considers wire tables, therefore, for those who would rather err on the side of safety—and *one should in a case like this*—20 S.W.G. would be better.

It is necessary, when using a parallel circuit, to make sure that the rectifiers are of identical types and suitable for use in such a circuit. Even more precautions than usual must be taken with connections; if, through any fault in this direction, the whole load was thrown on one rectifier, the heavy overload would, no doubt, cause its destruction.

Two-circuit Board

Even with a small charging station, it is desirable for facilities to be available whereby the most efficient operation can be obtained. Although the tapped transformer provides, at least, three output circuits—when considered individually, another complete rectifier section is the better arrangement. Normally, one would select a second rectifier having a higher maximum charging current than the first, thus extending the scope of the station, by allowing it to handle cells of widely varying current-rate requirements. As we are chiefly concerned with radio cells, the A 4 seems the best proposition as it can handle 1, 2, 3 or 4 two-volt cells at 2 amps., while the L.T. 10 can attend to 3, 5 or 6 two-volt cells at the same charging rate. Both in operation would, therefore, charge 10 cells at one period, assuming them to all be of the same capacity or charging rate and connected in series.

The circuit of the A 4 is the same as that of the L.T. 10, with the exceptions of the secondary winding and the value of the resistor R. The latter has a value of 0.5 ohms, and for this 30in. of 20 S.W.G. Eureka wire can be used, wound and mounted in the same manner as the 1 ohm resistor previously described.

The secondary has to provide 5.5 volts, 7.5 volts, 9 volts and 14 volts; this means that three tapping points have to be provided in addition to the two normal connections to the ends of the winding. Using the same stampings and primary winding as before, the

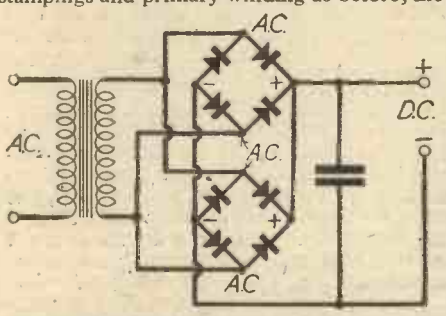


Fig. 10—The method of connecting two metal rectifiers in parallel to obtain a higher current output.

secondary will consist of 112 turns, tapped at the 44th, 60th and 72nd turns for the 5.5, 7.5 and 9 volt inputs, the full 14 volts being obtained from the complete winding, i.e., 112 turns. For selecting the required A.C. voltage, a rotary switch should be used, although in these days of component shortages, one could make use of a plug and three sockets, providing a perfect and firm connection is made between the male and female portions.

Separate Transformers

It is, of course, possible to wind a transformer with several secondaries or, in the case in question, make one set of stampings do for the supplies to the two rectifiers. The procedure—providing the stampings are of suitable size—is quite satisfactory, but, if two individual transformers are used, the whole station is not put out of action *if* a fault should develop in the *primary* winding. For this reason, and the fact that the plant being described is primarily a war-time emergency installation, constructed from those parts which are most readily obtainable, I would suggest using two separate transformers.

A suitable circuit is shown in Fig. 11, the values given being for the L.T. 10 and A. 4 rectifiers.

On the constructional side, the two-circuit board can be built in the charger assembly shown in Fig. 6 (July issue), the bottom shelf or baseboard being used to carry the mains transformer and A.4 rectifier for the additional circuit. Slight modification of the panel layout will permit the extra switches, etc., to be mounted. The new panel layout is shown in Fig. 12. where it will be seen that the controls are arranged in front of their respective sections. The value of adequate ventilation must be stressed with this new arrangement; the heat from the lower unit must not be allowed to increase the temperature of the air surrounding the upper section.

With one ammeter, and without introducing multi-contact switching, it is best to fit two leads to the meter so that it can be connected in series with the output of either circuit when required.

Making the Meter

The hot-wire type of ammeter is not difficult to make, and as it can be used on A.C. and D.C. supplies it forms a very useful accessory for any small charging station. It does not possess a high degree of accuracy—when compared with a moving-coil instrument—but it is quite satisfactory for simple current checks with the apparatus with which we are concerned.

As its name implies, the meter depends on the properties of expansion and contraction produced when the temperature of metal is varied. In this case a short length of resistance wire forms the metal element; this is fixed between two anchoring points, and, by means of a thread which is linked to the centre of the wire and passed round a pulley to which a pointer is fixed, the expansion and contraction of the wire produces movement of the pulley and pointer.

The heat produced in the wire is indepen-

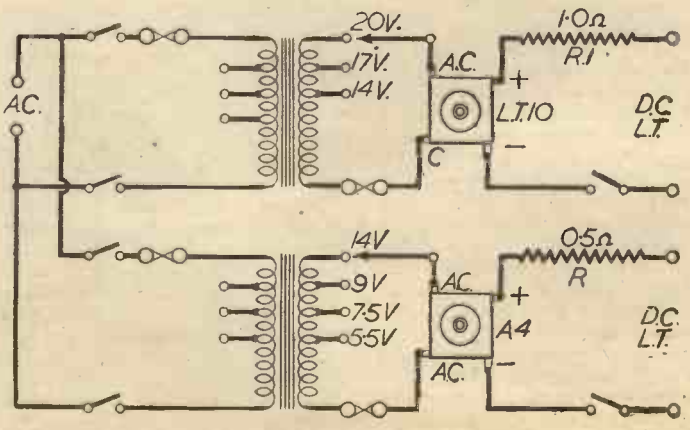


Fig. 11.—The complete circuit of a two-circuit charger, using a L.T.10 and an A.4 metal rectifier with separate mains transformers.

dent of the direction of the current, therefore A.C. or D.C. supplies can be measured. The movement of the pointer follows a "square law," which means that the scale divisions are close together at the bottom end of the scale, and opened out at the top end. In view of this, it is always advisable to design the movement so that the readings most required are at the top end, thus reducing the possibility of error by not having to rely on readings near the bottom of the scale. For example, if as with the chargers described the maximum current is 2 amps., the wire element in the meter should be selected and adjusted to give a top scale reading of, say, 2.5 to 3 amps.

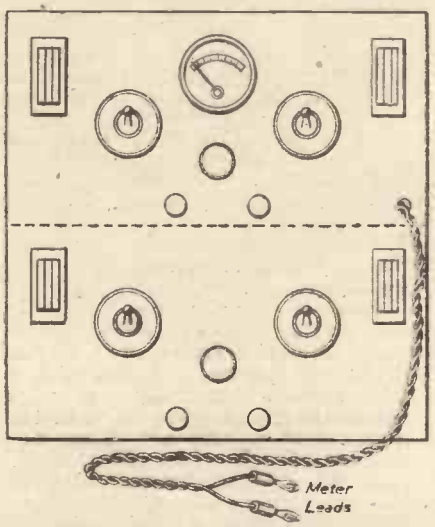


Fig. 12.—Shows the new panel layout arranged to control the two circuits individually.

It must be understood that the hot-wire ammeter is liable to suffer from variation of the zero setting or reading, due to the possibility of slip between the thread and pulley. Also, if the meter is kept in circuit over a prolonged period, errors might be introduced by the expansion of the meter assembly. These defects, however, need not cause any worry to the operator of the small charging plant, as it is an easy matter to set the pointer at zero—when necessary—and eliminate frame expansion problems by using the meter only for *short* periods, i.e., sufficient to check the current.

Assembly

The main constructional details are given by Fig. 13, where it will be seen that the design lends itself to various modifications to suit individual ideas, facilities and materials obtainable.

The writer used a disc of $\frac{3}{16}$in. fibre, having a diameter of approximately 4in. for the base. Around this was fixed a strip of 22 gauge tinned plate, having a width of 1in. One end of the resistance wire is anchored to a small terminal of the telephone type, the shank of which passes through the base and, after being locked in position by two nuts, forms a convenient connection for one side of the meter circuit. The other end of the wire is fixed to a short strip of $\frac{1}{2}$in. wide steel spring which is secured to the base by means of a small right-angle bracket. On the tinned plate surround or wall a 4 B.A. full nut is soldered—after a clearance hole has been drilled in the plate—in line with the upper end of the spring. Through the 4 B.A. nut is screwed a short length of 4 B.A. rod, one end of which is filed to a point and across the other end of which is made a saw cut to take a screwdriver. This part of the assembly allows the tension of the resistance wire to be varied, thus providing a simple adjustment for the re-setting of the zero position of the pointer when necessary.

Below the centre point of the wire, a small brass pulley is located—by means of a bolt and washers—so that it is free to rotate without undue play. In the model first made, one of the small metal pulleys used on some types of radio receiver dials was used, therefore it is possible that a suitable item might be found in most junk boxes. A diameter of, say, $\frac{3}{4}$in. is satisfactory. The scale needle or pointer is made from a length of 22 S.W.G. wire—straightened and the scale end of it flattened to form a knife-edge at right-angles to the scale—while the other end is soldered neatly to the upper face of the pulley.

Before fixing the resistance wire to its anchoring points, a small bead, having a length of approximately $\frac{1}{8}$in., is threaded on to it, and it is to this bead that the thread operating the pulley is fastened. After fixing, the thread is passed once round the pulley and then anchored—under sufficient tension to ensure it gripping the pulley—to a light spring made from a piece of spring wire. A little care must be taken to adjust the tension to just the right amount; if it is too great, the pointer will not return to its zero setting freely.

The scale can be made from tinned plate or stout Bristol board; the material is not important so long as it is rigid and the calibration marks easy to observe. It is fixed in position by two bolts passing through the base, nuts being used to secure the correct distance between scale and base.

Calibrating is best carried out by making test readings, say $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ amps. and so on, to the desired maximum, in conjunction with a reliable ammeter. The pointer positions should be lightly marked on the scale, and then, after removing the latter, the numbers can be put on in detail. Be sure that the scale is re-fixed in exactly the same position, otherwise errors will be introduced.

Mounting the Meter

Some readers may care to cut a glass disc and fit it inside the tinned plate surround; others may choose the easier method which I used. On the panel to which the meter was to be mounted I cut out a shape corresponding to the circular portion of the scale carrying the calibration markings. Over this—at the back of the panel—I fixed a rectangular strip of glass, and then mounted the meter so that the scale readings were visible from the front. To fix the meter to the panel, three small angle brackets—cut from tinned plate—were soldered to the meter surround and bolted to the panel. The connections to the meter are made to the terminal and the bolt holding the steel spring fixing bracket

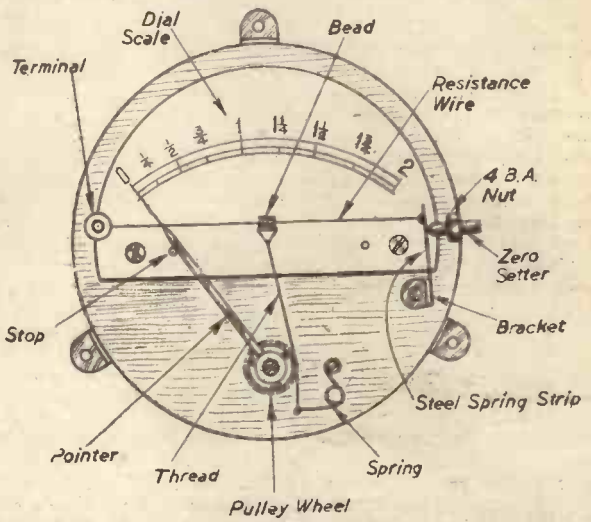
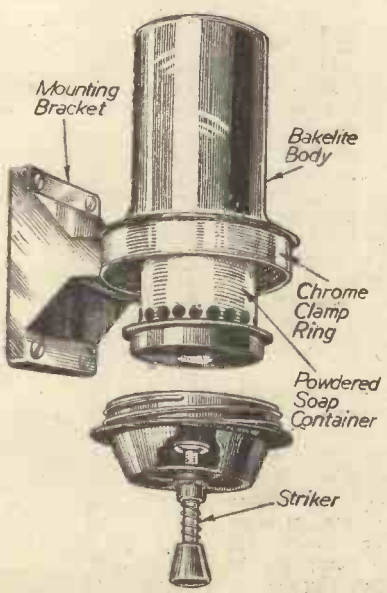


Fig. 13.—The constructional details of the meter, showing the method of adjusting tension of wire, and pointer operation.

A Novel Dispensing Device

THE accompanying illustration shows a simple dispensing device for powdered soap, which is the invention of Mr. A. C. Reeve, of North Harrow. The device is made from moulded plastic material, such as synthetic resin, and is adapted for fixing to a wall by means of suitable screws. As shown in the illustration, a cylindrical container is arranged telescopically within an outer casing. The upper end of the inner container is open, the lower end being closed and provided around its periphery with a series of discharge holes. The inner container may consist of a cardboard carton, which can be renewed each time a fresh supply of powder is inserted in the device.



A dispensing device for powdered soap, with bottom part removed.

The lower part of the outer container, which is shaped as shown, has a number of radial arms supporting a central bush in which a spring-pressed push-rod slides.

Operation.

When a small quantity of powdered soap is required the knob on the end of the push-lever is pressed upwards by the user, and as the top portion of the outer casing is closed, the air entrapped within the casing is forced partly through the powder, thus causing some of it to pass through the openings. The puff of air also blows the released powder down through the hollow bottom of the casing into the hand of the user.

Refills of powdered soap are sold in cardboard cartons provided, of course, with lids. When a new supply of powder is required in the dispenser, the lid of the carton is discarded, the holes round the bottom edge are opened, and the container, after being fitted into its supporting cap, is gently pushed upwards into the outer casing. The lower part, with push-knob, is then screwed in place.

CABLE

The Many Activities Connected with Deep-

Captain W. H. Leech, of the "Iris," marking up the echo-sounder chart. This instrument records a graph showing the exact formation of the sea bed over which the ship is passing.

THE recent voyage of H.M.T.S. *Iris* recalls the romance of deep-sea cable laying. Completed about two years ago, the *Iris* was built specially for the duties of laying and repairing submarine telegraph cables, and as such she represents the outcome of many years of practical experience.

The First Atlantic Cable

Before the first ocean telegraph cable was laid between Ireland and America, in 1857, a rough survey was made by Lieut. Maury, an American, who discovered that the ocean bed between Ireland and Newfoundland was particularly suitable for the reception of the cable. During the soundings an extensive plateau was revealed which proved ideal for supporting the cable at that particular part of the ocean bed. In more recent times, when the Western Union cable was being laid, it was discovered that a group of hitherto unrecorded mountains existed beneath the Atlantic, the highest of them being estimated at 6,000ft. above the surrounding ocean bed. Various other soundings have revealed huge pits or craters of incredible depth in various places, and it is essential that such irregularities in the ocean bed should be discovered before commencing to lay the cable, otherwise great strains would be put upon it.

The first attempt to lay the Atlantic cable, in August, 1857, failed through stretching it so much that it snapped, and went to the bottom at a depth of 12,000ft. The work was resumed twelve months later, and shortly afterwards the first signals were received over a distance of 2,050 miles.

Preliminary Surveys

Submarine cables are not laid in the greatest depths owing to the strain involved when being raised for repairs. The greatest depth at which cable has been laid is about 21,000ft. (3,500 fathoms).

When making the preliminary survey, the cable ship usually steers a zigzag course along the line of the proposed route, each arm of the zigzag being approximately five miles in length, soundings being taken at the end and centre of each arm. There are two systems of taking soundings which are commonly used, the line-and-sinker method, and the sonic or echo system. The great advantage of the latter system is that the ship does not have to be stopped while the sounding is being taken, as is necessary when line-and-sinker machines are used. When it is necessary to know the exact nature of the ocean bed, line-and-sinker machines must be used, as by this method samples of the sea bed can be brought to the surface for inspection, thus revealing whether a cable will lie on coral, rock or sand.

Another important point is to know the temperature and pressure of the sea at any point where a proposed cable is to be laid, as these factors have considerable bearing on the insulation resistance of the gutta-percha covering of the cable.

Cable Storage on Board

After the preliminary work has been done, the new cable is hauled on board the cable ship, and placed in storage tanks. This operation, however, is not so simple as it may sound. The storage tanks are circular, and into these the cable has to be carefully coiled in layers. This care is necessary, for should a kink occur in the subsequent paying out of the cable, it might be broken; and a serious accident caused. For safety purposes, life-lines hang down from the tops of the tanks

Coiling cable on the raft. Nine tons of this one-core concentric cable go to a nautical mile. Over it several conversations can be carried on simultaneously.

Seamen cable hands wading through shallow water with one of the shore ends of a cable.

LAYING

With the Laying and Repairing sea Cables

within easy reach of the men working there, so that they can make a hasty exit should the cable get "out of hand" during paying-out operations. While the cable is being coiled the tank is flooded with water to cover each layer as the work proceeds, as the gutta-percha covering is liable to crack if kept dry.

There are three kinds of cable—deep sea, intermediate, and shore end. Intermediate and shore end cables are more heavily protected with steel wire than deep-sea cable. The action of the sea, rocks and similar factors makes it essential that the first-mentioned cables be capable of resisting rough treatment. On the other hand, deep-sea cable lies undisturbed, perhaps for years, on its ocean bed of sand or ooze.

Laying Shore-end Cable

The work of laying shore-end cable often proves to be difficult work, owing to the fact that usually the cable ship cannot get close enough inshore. As several tons of coiled cable have frequently to be ferried to the shore, calm water and a moderate wind are essential if trouble is to be avoided. The cable is coiled on to lighters on rafts which are towed inshore by a motor launch and one end of the cable is then hauled on to the beach by the seamen cable hands, and laid in a trench leading to the cable house. The lighter is then towed seaward, paying out as she goes, and the seaward end of the cable is then hauled on board the cable ship for splicing to the main deep-sea cable, or to the intermediate cable.

In hauling the end of the cable up the foreshore the seamen are sometimes assisted by a squad of Post Office workers, or other helpers anxious to lend a hand. In tropical parts of the world crowds of natives often help in the work of hauling the cable up the beach.

The points for bringing in the shore-ends of cables are selected as far as practicable from anchorages, to avoid the risk of the cables being fouled by anchors.

A cable jointer at work, joining the two ends of the cable which, when the task is completed, will be lowered overboard midway between the shore ends.

Paying Out the Cable

For paying out the cable, cable ships are provided with sheaves at the bows and stern, and duplicate paying-out and picking-up gear is fitted. The cable is paid out from the bows of the ship when operating in shallow waters, as it has been found that under such conditions the ship answers her helm better when the cable is paid out over the bows. When operating over great depths of sea the stern sheaves and paying-out gear are used.

The cable passes out of the storage tank, over sheaves on the deck, then round the drum of the paying-out gear, under the sheave of a dynamometer, and thence over the sheaves at either end of the ship and into the sea. As the cable is being paid out the dynamometer indicates the strain to which the cable is being subjected, and the brakes of the paying-out gear can be operated accordingly.

An interesting point about cable laying is that a certain amount of slack has to be allowed to conform to the contour of the sea-bed. It is also important that the cable should not bridge projecting peaks.

At regular intervals while the cable is being laid, electric communication is maintained between the shore and the ship. This is a necessary precaution against the laying of, perhaps, many miles of cable after a fault has occurred. Directly a fault is discovered, steps are immediately taken to remedy the trouble. The electricians, by special tests, can find out if a fault has developed in that part of the cable still laying in the tanks, and the fault can then be put right before the cable is laid.

When comparatively short lengths of cable are to be laid it is the usual practice to lay both shore-ends first. Thus, when a cable ship approaches the end of the deep-sea

As the launch tows the raft shorewards, cable is paid out from the ship to the raft behind which follows a small boat. She will pick up any men who may be thrown from the raft.

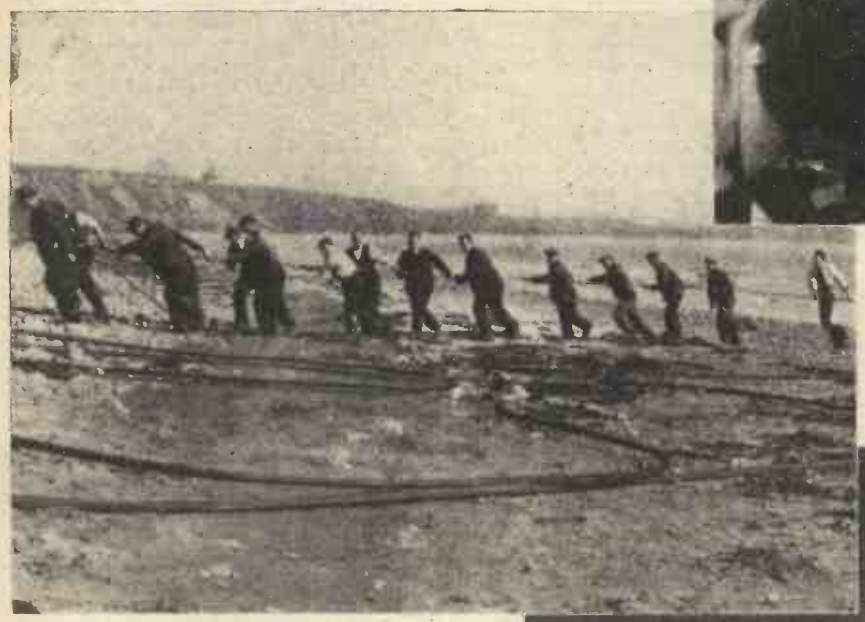
cable, her look-out men watch for the buoy marking the position of the farther shore-end. When reached, the buoy is cast off, and the shore-end is hauled aboard. Tests are made, and if the cable-end is in working order, the splice is made, and the cable is then complete from end to end.

Repair Work

The modern submarine cable rarely breaks down, but when it does, the trouble is usually due to outside causes. Shore-ends may become chafed against rocks or coral and, occasionally, sharks, swordfish and even whales cause trouble with the deeper cables.

It is interesting to note that a fault in a cable, perhaps hundreds of miles out to sea, can be located by the electrical engineers

In this illustration (right) the navigation officer on the bridge of the "Iris" takes a bearing.



When a shore end has been carried to the beach, a squad of Post Office workers augments the crew. Carefully the cable is hauled up the foreshore to where it will be connected to the terminals in the cable hut adjoining the shore, and laid out in long curved strands to facilitate haulage.

ashore. The resistance per mile of the cable is known, and by balancing this resistance with artificial resistances, the exact distance of the fault from the shore-end can be located. In some cases a repair ship may have to seek the ends of a cable that has been completely severed.

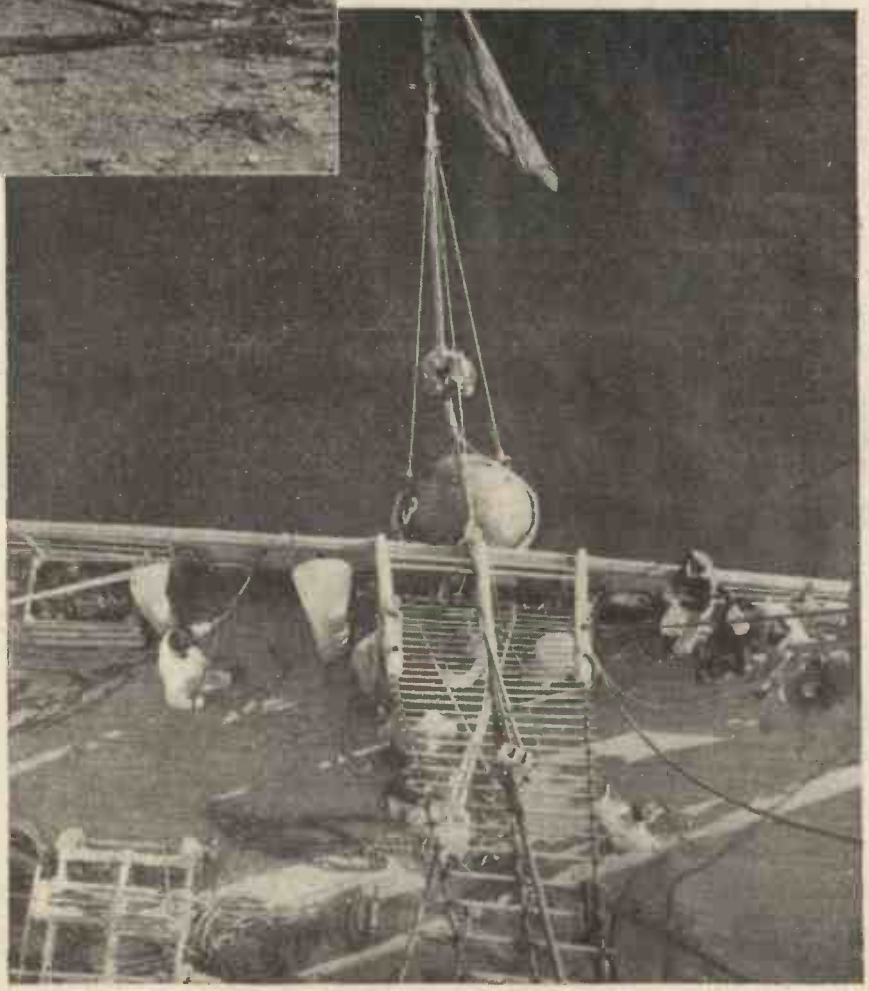
On arrival over the faulty part of the cable the repair ship puts down a mark buoy to indicate the spot. The buoy, moored with special mushroom anchors, is surmounted with a flag to make it conspicuous, and acts as a centre for the repair ship's grappling operations, which are carried out by means of special grapnels that lift the cable from the ocean bed.

Splicing

When the grapnel has engaged one end of the cable it is hauled up, and men are lowered over the bows of the ship to secure the cable with chains and ropes. Leads are then taken from the conductor to the test room on board, and tests taken to discover the exact position of the fault. When it is ascertained that the faulty part of the cable has come inboard, the cable is stoppered, cut, and a new portion is spliced on. After further tests have proved that all is in order with the new portion, the repair ship proceeds to pick up the other end, a further splice is made, and the repaired cable is then in working order again.

When making a joint in a cable it is essential that no air bubbles be allowed to become imprisoned in the gutta-percha insulation, because if such bubbles were present they would be liable to burst under the sea pressure, thus causing another serious fault.

In grappling for a damaged cable in places where there are a number laid on the same route, there is the risk of disturbing the wrong cable, and to avoid this risk, divers are sometimes sent down to find the damaged cable, and repairs are then carried out.



A picture taken from the crow's nest of the "Iris" and showing one of the great marking buoys ready for dropping. Seamen cable hands are standing by for the order to let it go.

PHOTOGRAPHY

MAKING INTERESTING PORTRAITS

How to Add Life and Atmosphere to Your Snaps

By JOHN J. CURTIS, A.R.P.S.

EVERY year there are many thousands of films exposed on snaps of friends taken on various occasions, on holidays, days on the beach, in the woods, in back gardens, at weddings and sundry other places. Most of the results from these lose all their interest as soon as the friends have seen a print; the owner keeps the prints in his or her pocket or wallet for a few weeks perhaps, then they are relegated to a drawer or box to await the day when spring-cleaning demands that they must be thrown away, or found a new resting place where they can be forgotten.

Why is this? They are all records of some happy times you have had, and it is very nice to look at them years afterwards and to recall the occasions. That is quite correct, but if they were really good, why not put them in an album with one or two suitable notes and so make them interesting to other friends, who were not of the party? This can be done if in the first place a little more care and thought is used at the time of taking the snap. Consider the few examples which are given to illustrate what is meant by a little more care and thought.

Arranging a Group

Three or four of your friends are out with you on a day's hike; at midday a pleasant spot is found for your picnic lunch, and down you sit, eager to get at the sandwiches or other good things in the kitbags. While you are eating, one of the party suggests that you take a snap, and then up you get and, without any preliminaries, click goes the shutter and you have taken a "portrait" of your four friends all with either a sandwich or a glass of something in their hands, and all staring full face at the camera lens. The result is quite funny, and good as a snap, but what a pity one of those four was not standing up making some witty remark to the others who were interested in what he was saying, and not in what you were doing; or with one standing and another kneeling, and speaking to the two sitting. Even if one had his back turned to the camera it would be quite possible to have his face in profile so that everyone could recognise him; forget the idea of eating, as such a snap is so very commonplace, and it is so obvious that some refreshments are being devoured.

Later in the day you may all be resting on a stile, and again comes the suggestion of a snap, and your friends remain sitting on the stile like so many sparrows on the telegraph wires. Now is your chance to do a little arranging; tell the shortest person to get down and to sit on the ground, or bank, a couple of yards to the left of the first one on the stile, get the tallest of the others to stand about three feet from the stile, and on the right with his left shoulder towards the camera and to be talking to the two on the stile. It is important to see that the legs of these two are in different positions, and not having their knees at the level of their chests; it will not take many seconds for you to do the arranging, but do not be in a hurry to expose—wait for the fellow who is standing to say something that will attract the attention of the other three, then is the time to do the snapping, for they are then free from camera consciousness.

"Conversational" Piece

What is your opinion of those family groups taken in the garden, father and mother seated in front of a row of sons and daughters in steps, with the eldest on one end and the youngest at the other or on a cushion in front? Now, if any of you are members of that excellent "Snapshots from Home" League, and are taking snaps for sending to our boys in the Forces of their folks in the garden at home, here is an opportunity to put some thought into the work, and you will be surprised how your efforts will be appreciated by all concerned, and especially by yourself. To start with, father must have his jacket on; shirt sleeves may be his idea of freedom, but they do not look very artistic, and will not please for long. He is probably a little taller than mother, so let them be talking to each other, the two girls standing together about two feet from the parents, while young Jim can be on the other side of the girls with his barrow, and busy loading it. Another suggestion is to get father talking to two of the party and mother with the others if there are enough; try to get the idea of a "conversational" piece. In taking these types of portraits it is always good practice to let the subjects watch you while getting ready, and then just when you are going to "shoot," to suddenly turn your head and look as though you have seen something extraordinary in that tree or on the fence; you will find that their eyes will immediately turn away from the camera, and you will possibly get a very nice expression on the face of each.

A fine example of a "conversational" picture, showing how naturalness and life can be produced by attention to detail.

Large Groups.

The next example is a group of several individuals, about a dozen, and the usual arrangement is a couple of rows, one sitting and the other standing at the back; this may answer quite well in some instances, but if they are friends who have met for some reason at your house, and if the weather permits, why not make a little preparation beforehand in the garden? A small table will aid the arranging, especially if it happens to be a rustic garden table, and three or four chairs placed, two at the side farthest from where you intend standing with the camera, and one on the left and right. These chairs should be occupied by the four who are the most important, or the eldest of the guests. On the left of this group tell three of the others to stand and to be in conversation, and place another between this little group who should be talking to the party sitting at the left-hand side of the table. The remaining four can make a couple of pairs on the right-hand side of the table, and one of each pair should be facing the camera and the other two turned towards his or her companion. If the party consists of six of each sex you can form quite an interesting group of three of either, but do not attempt to pair each lady with a gent.

It is possible that your group may consist of many more than a dozen, and in that case you have no alternative than the stereotyped one of so many sitting and the rest standing. These are the usual record photographs of a troop of scouts, school, house party and similar bodies, and are only taken for the purpose of a reminder of the occasion, and certainly not for the object of making a picture. In such a group there is usually someone who is moving, and perhaps another who insists on talking; very often the photographer is so long focusing and arranging the group that the majority have lost a great deal of interest, and are looking bored. It is an easy matter to do all the focusing before the party comes out; place a stick or a white handkerchief in the middle of the front seat, and focus that till it is definitely sharp. Put the handkerchief at the extreme ends of the forms or seats, and see if these come into the picture, then place it in a conspicuous place at the back where the back row of the group will be standing, and make sure it is in focus in that position. The next thing to do is to have your camera set ready with the correct stop and shutter speed all calculated before the party arrives. As they come out quickly, spot those who you think will be best for the front row and get them to take up their positions; ask the company not to move the seats and to get their places as quickly as possible. Keep an eye on the sides so that there is no overlapping of the spots which you have decided are the limits; one quick glance at the focusing screen or the viewfinder, and all is ready. If you have to make a time exposure, be sure to tell the folks that it is going to be one of two or three seconds, and you will see that they will respond, and keep quiet. It was the practice of one clever photographer to always ask the members of a group to look just over the top of his camera, and this caused them all to very slightly raise their heads just sufficient to avoid shadows over the eyes. In taking these large groups there is a very great need to keep the party in a pleasant frame of mind, and usually this can be done for you by one of the party, but failing that you must endeavour to keep the company amused till you are ready to make the exposure.

THE WORLD OF MODELS

By "MOTILUS"

An International Personality Discusses His Own Reactions to the Fascination of the Model Railway Hobby

ONE of the most colourful figures in the modern world of sport—pre-war, of course—was His Highness Prince Birabongse of Thailand. Prince Bira was a popular and respected exponent of the art of successful motor racing; but few perhaps, in comparison, know of his other absorbing hobby, which he is still able, fortunately, to continue in war-time.

But it was not as easy as all that . . . . Let us read what he has to say about it:

Complete Relaxation

I suppose you can call it a complete relaxation from a 145 m.p.h. drive in a racing car to shunting a few wagons into the goods sidings of my model gauge "OO" railway—but, alas, these pleasurable pastimes came to an abrupt end in September, 1939. But, being a die-hard fellow, who could not exist without some form of miniature railway system in the house, I had to seek some way to satisfy my whims.

Evacuated down to the country from my London studios I felt definitely lonesome without some sort of system to work on. I began to pine for the metropolis, and in particular for my layout on which I had just put the finishing touches to the "OO" gauge S.R. Victoria–Dover in perfect scale.

It was a problem to decide whether to strip those carefully pinned down nickel rails and many complicated points, and risk the possible damage, or to leave it all alone and buy more stuff. Either would mean trouble and cost, so I decided to visit that Happidrome of the model world—in other words, Bassett-Lowke's fine establishment in High Holborn. There I was skilfully handled by my old friend, Mr. R. Fuller, who finally persuaded me that Trix trains were the solution to my difficulty. I must admit that at first I was quite sceptical about their range and the appearance of the rails and curves. After my beautiful 3ft. curves and wonderfully realistic cross-overs, those tin rails of Trix with their black bakelite bases looked unattractive. But everyone makes a mistake sometime, and now I am willing to admit mine. I studied every point in favour of this system, and, finally, I saw that the horror I had expressed at the first sight of this railway was quite superfluous, and it was soon drowned by all the other fine qualities of the Trix system.

The Trix System

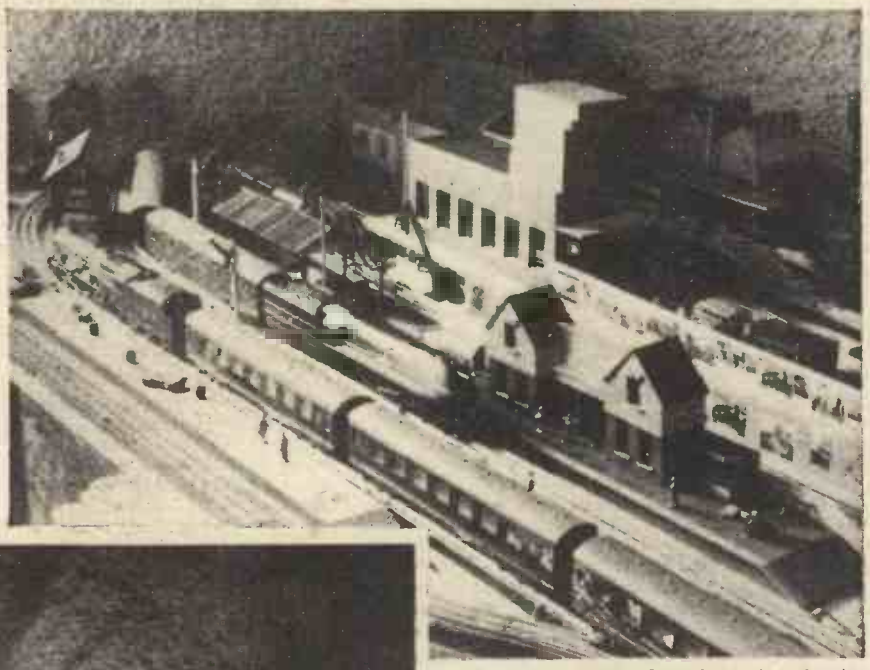
Readers may be interested to know the main reasons why I was won over by Trix. Firstly, my immediate requirement for a miniature railway was that it must be portable, as I did not know where or when I should move from place to place. So the Trix system answered my purpose to the full. At first I went cautiously, and bought just a set of straight lines and curves, enough to make a loop with a few points for sidings. Then I bought an 0-4-0 tank and a streamline locomotive with some suitable coaches. This was my first "taste" of Trix toy trains—a simple layout set up on a sideboard along a passage. And the first thing which now struck me was the way these two locomotives functioned. They were quite amazing! To be able to run two different trains on the same piece of rail in one section certainly presented great possibilities. The next point I noticed was that each of these locomotives worked backwards and forwards without any hesitation or trouble at the slightest touch on the control knobs.

I had hardly spent 15 minutes playing with the Trix trains when my eyes had become used to the tiny rails and sharp curves and the inaccuracy of the scale. I did not notice it any more, and all my interest centred in the perfect working of the system. The joy of my discovery of the Trix trains I cannot now express enough, for even after nearly three years the system provides me with novelty, enjoyment, and much food for thought.

I soon had a proper wooden trestle made with a top to it, and the whole thing was just 3ft. 2in. by 8ft. 10in., stretching into one corner of the long corridor. I chose the L.M.S.R. because I so much liked the look of the streamline Coronation train, and also I could get a very nice looking 4-4-0 compound engine with a handsome tender. In fact, the range of rolling stock offered in this company's colours was greater than either L.N.E.R. or S.R., so I ordered more of the Trix material. Originally, I had intended to have them all packed in crates for taking out to the East, but at the same time I still used a small portion on the wooden bench I have already described. I spent sleepless nights putting the lines up and did "underground" wiring. The controllers were placed just below the board, and all the signal and point levers were neatly grouped together beside them.

A New Layout

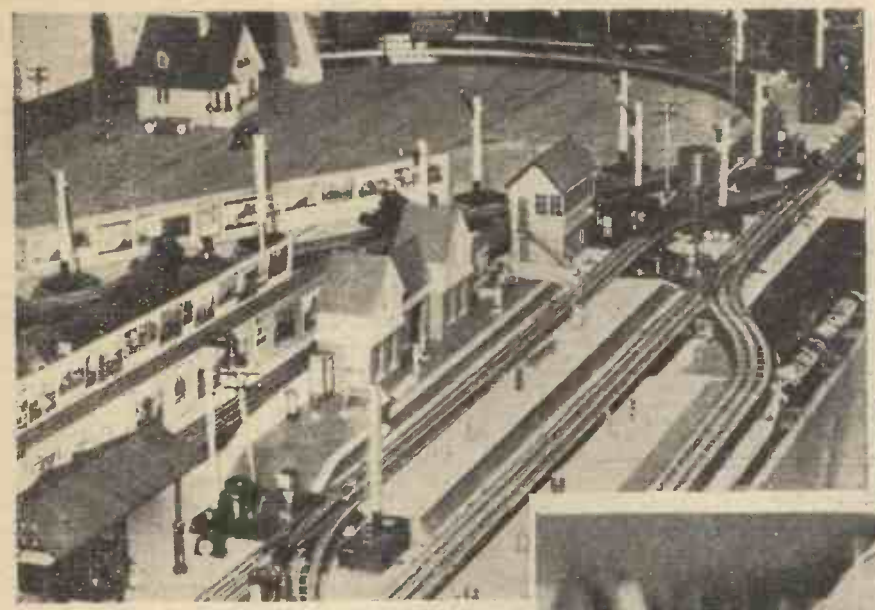
I had three alternatives: (1) just two loop



A busy scene at the through station showing the Coronation Scot entering, and the Midland express hauled by a Princess class locomotive standing at the platform. In the background is a terminus station.

A striking night effect on the model railway.

running round and round and going to no particular place; (2) point to point; or (3) point to point with double tracks incorporated. I chose the last plan, and after considering the space available in that passage I laid down two oblong circuits running parallel to each other giving the appearance of a double track way. Then I placed the first terminus inside the loops at one end of the curves. I gave the station a one-span ferro-concrete "many ways" glass roof with a handsome clock tower at the side. The



The main line through station, showing entrance to one of the termini on the left.

other terminus was outside the two loops right at the opposite end. The third station was a kind of through station which came in the middle of one of the straights of the loops.

Electric Train Indicator

As I have found that the Trix system was very reliable as far as working operations went, I devised a certain system for running the trains. Firstly I chose the Euston-Glasgow line and called the "inside terminus" Euston, and the "outside" one Glasgow. Of course there were other important towns between these cities at which the trains had to stop, and so I arranged that every time the trains had reached a certain station en route, such as Crewe or Lancaster, the trains came to rest at "the through station." Therefore the middle station was a kind of multiple station which the trains used for stopping before they had reached the end of the journey. In order to visualise things more clearly I spent a good part of four hours fret-sawing out of plywood a large map of the British Isles 4ft. 8in. high. I put in 102 electric bulbs on the path of the L.M.S. line which dealt with the journey from Euston to Glasgow. I wired up all these bulbs to a kind of revolving controller which would light up each bulb in turn. There were 51 bulbs for the up trains and 51 for the down trains. Each bulb represented a complete lap so when I sent one particular train out on its lengthy journey to Glasgow from Euston, or vice versa, I could tell at a glance how far it had travelled. Also I could bring it to a proper stop at the right station after having covered the right distance. But now arose the snag. Surely no train on earth could make the 400 odd miles in just about 20 minutes or so on my map. So I had to quicken the time up by moving one or two cogs from my stopwatch. I managed in this way to work the clock up to suit the map, so that the Coronation Scot took just about 6½ hours of my scaled time like his big brother.

Night Lighting

I must say I derived a great amount of fun out of the small circuit I put up in 1940. Everything worked perfectly and when "night fell" my own house, station buildings and various yards were lit up by the Lilliputian lamps, and it certainly made a pretty little scene. My joy was to place my face at eye-level with the track and watch the red and green lights on the signal columns change colour in the dark. It was good to feel that at least in this railway of make-believe there was no black-out or anything—though strictly speaking I suppose there should have been a black-out too!

A year later, deciding not to return to my country, I opened up the big cases and brought out the rails and points and buildings. I still kept to the general idea of the layout but increased the length of the straights, and also enlarged the area of the two termini. This meant cutting down my dressing-room just to leave sufficient space for dressing, while I tried to fill the rest of the room with rails! I had quite an ambitious scheme in mind incorporating lighting in the coaches when running at night. This innovation was achieved with the aid of many complicated sectionings, and I had to use two extra controllers. The lamps on the map worked automatically with the trains, and so, for example, when I set a non-stop express out from Euston to Glasgow, the train would have gone on running by itself, and I could go out of the room for the duration of the journey and still come back in time to bring it into the terminus just when the lights arrived at the one which showed Glasgow.

Prince Bira adjusts one of his signals.

Map showing L.M.S. route with electric lamps and contacts giving the position of the train on the track.

Rebuilding

With my larger layout and the increase in the time needed to run through the time table, I was not able to give my railway as much attention as I would have liked, and the system became dirty and unmanageable. So my latest occupation now is to rebuild the railway and cut down the ambitious double-track system to a single-track point to point, and to modify the "point works" drastically. Also, I am changing the name from L.M.S.R. to B.R. and altering the colour. My railway will be running on the imaginary Birix Isle (Bira and Trix), and being a modestly small island the line will be just a single track.

Our Busy Inventors

By "Dynamo"

Making Faces

TO change the shape and expression of the human face is the object of an appliance for which an application for a patent in this country has been accepted. The inventor has had in view the requirements of the theatrical and motion picture worlds.

The actor frequently represents a character whose lineaments are totally different from his own. The lines of the face, for instance, must be altered to picture age or tragic grief. It is claimed for the appliance in question that it will transform the countenance to any desired form and expression. It consists of an insert which can be fastened on the teeth. The inventor maintains that it will change the expression first by altering the position of the so-called "deflection fold." By this is meant the mucous membrane which connects the internal membrane of the face with the gums. In this way we are told it is possible to make a young face old, an old face young and a round face oval or square. The mouth may be formed to appear thicker or thinner and the shape of the chin can be changed.

The form, surface or position of the insert is different for each case, according to the nature of the physiognomy.

This contrivance may prove to be an asset to the beauty specialist and also to the surgeon who corrects irregularities in the human countenance.

As an Irishman might put it, the invention is a kind of trouser-stretcher for the face.

Anti-crease Solution

IT is not a far cry from wrinkles in the face to creases in cloth.

Improving the crease-resisting properties of textile materials has been occupying the mind of an inventor.

These materials, when subjected to chemical treatment, are less liable to crease, and they also readily recover from the effects of having been creased.

The inventor in question affirms that this result may now be attained by the aid of resinous condensation products.

By the way, it is worthy of remark that, whereas, in one case, the crease is regarded as a defect, in another, when it descends regularly the front of the trouser leg, it is a thing to be desired.

Permanent Tie

WHAT may be termed the horizontal tie, as worn by the Premier, is not seen as frequently as it was in the dignified days of Queen Victoria. However, for evening wear it still surmounts the immaculate shirt-front.

Now it is not the hand of every man which has the cunning to tie such a bow. Therefore, the made-up bow-tie is often in use. This is kept in its place usually by being fastened with buckles at the back of the collar. There are, I imagine, very few men who attach their bows to a front collar-stud by means of a tiny elastic loop, which was the method used once upon a time by the juvenile.

A made-up tie lasts longer and remains cleaner than that which is continually tied, because the constant handling necessitated by the latter action involves wear and tear, and is apt to soil the fabric.

To obviate the inconveniences mentioned, an inventor has designed an improved made-up bow. This comprises a front bow portion and two neckband parts adapted to be fastened at the back of the collar. There is a short piece of elastic ribbon at the end of each neckband portion. And each of these ribbons has at least one buttonhole or eyelet for fastening the elastics on to the back collar-stud.

Novel Nozzle

THE fire-hose can play a double part. It is possible for it to project a continuous jet or it may spread its water in a fan-shape spray.

According to a new invention, a fire-hose nozzle incorporates a jet and a spray which can be used either independently or in conjunction. There are two bores which are controlled by separate manually-operated valves and communicate at the inlet end with a common coupling connection to the hose.

Thus, in fire fighting, the spray can be used to prevent the spread of the fire, while the jet is directed on to the burning material.

If desired, means may be provided on the nozzle for connecting either the jet or spray or both to a can containing a chemical solution for the extinction of oil or spirit fires. When mixed with the water supply through the nozzle, this produces a fire-extinguishing foam. The chemical solution is drawn into the water stream issuing from the spray or jet by the suction or induction effect.

Resilient Socks

FROM fire-hose I turn to hose of a different character. A recent invention relating to socks is worthy of consideration. The socks concerned are of the kind known as seamless, wherein the heel and toe are knitted in the form of a seamless pouch.

It is not necessary for me to inform the industrious housewife that stockings and socks made from woollen yarns have, when washed, an unfortunate tendency to shrink. Such shrinkage causes a shortening of the foot from toe to heel.

The sequel is that not only are the socks uncomfortable, but they exhibit an increased tendency for the toe to wear. The abbreviated foot part of the sock also conduces to a strain on the fabric, which renders the heel of the sock as vulnerable as that of Achilles.

The remedy proposed by the inventor of the new device to which I have referred is the incorporation in the sock of elastic yarn.

Heat Salvage

THE salvage of heat is the *raison d'être* of an improved fire-place of the open type. The inventor points out that it has long been recognised that, while an open fire is a pleasant and genial means of warming a room, it is extremely wasteful, since a large percentage of the heat goes up the chimney.

He further remarks that there have been several proposals made with the object of increasing the heating efficiency of open fires by means of a number of tubes placed at the base of the fire-place and extending upwards along its back. These are finally brought across the bottom of the chimney, the tubes being open at their upper and lower ends. As a consequence, air in the tubes is heated and causes a natural draught up the tubes in order to deliver hot air above the fire opening. The effect of such constructions is only to deliver a small quantity of very hot air to the atmosphere above the fire-place.

The object of the new device is to utilise the heat of an open fire to produce an even temperature throughout the room. This contrivance comprises one or more conduits extending along the base of the fire-place and upwardly through the flame zone, through which hot combustion gases escape to the chimney. These conduits are in communication with the atmosphere above and outside the fire-place, and mechanical means conduct air through the conduits.

Exhibited at the New York 1942 Inventors' Exposition. A solid timber portable air-raid shelter in which three people can sleep in safety. It can be set up in 10 minutes, and no metal or nails are used.

QUERIES and ENQUIRIES

A stamped addressed envelope, three penny stamps, and the query coupon from the current issue, which appears on back cover must be enclosed with every letter containing a query. Every query and drawing which is sent must bear the name and address of the reader. Send your queries to the Editor, PRACTICAL MECHANICS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Wind-driven Dynamo Details

I ENCLOSE particulars of a dynamo which I intend rewinding to produce 12 volts at a very slow speed, using wind as my source of power. I would like to know the most suitable gauges of wires to use on armature and field coils; I think the armature could be wound so as to operate a cut-out at 250 r.p.m. It would not matter a great deal about a high output if the speed can be brought down. Hoping you will be able to supply information regarding wire gauges and number of conductors; also what is the lightest wood to use for making a propeller able to withstand weather and keep its shape?—R. Wallace (Kilnock).

SO far as can be gathered from the rather vague particulars given, you have an armature 4in. in diameter by 6in. long with 29 slots $\frac{3}{16}$in. wide and about $\frac{9}{16}$in. deep, running in a 6-pole field, and connected to an 86-part commutator. The sectional area of the field poles is $5\frac{1}{4}$in. by $\frac{3}{4}$in., or about $4\frac{1}{2}$ sq. in., and allowing a flux in the airgap of 50,000 lines per square inch there would be a total flux of 675,000 lines for the three pairs of poles. As a wave-wound two-circuit armatures the conductors (Z) necessary to produce a terminal voltage (E) at a speed of 4 revs. per second (240 r.p.m.) in a flux of 675,000 (N) would be:

$$Z = \frac{E \times 10}{n \times N}$$ or in figures:

$$\frac{3 \times 100{,}000{,}000}{4 \times 675{,}000} = 444$$ conductors in series, that is 888 when connected in two-circuit wave-winding. This would represent 30 conductors per slot in 29 slots, or 10 conductors per coil grouped three-per-slot to suit the 86-part commutator. One of these coils would need the ends cut off short and insulated, leaving 86 active coils to suit the same number of commutator bars. The span of the coils in the slots would be approximately the same as the pole pitch, or one slot less, and the method of laying out the commutator connections will be found described in A. H. Avery's "Practical Armature Winding." The diagrams for an armature of this size would take too much space here. At the very low speed of 250 r.p.m. required it will be necessary to separately excite the fields, and as the generator will presumably be used in conjunction with a 12-volt accumulator the field circuit can be excited direct from the battery. It will also be necessary to use high-conductivity copper-carbon brushes on the commutator. Probably the largest gauge of wire that can comfortably be got into the slots will be No. 22 s.w.g. double silk covered copper, which will carry up to $3\frac{1}{2}$ amperes without getting injuriously hot. If larger wire can be accommodated the output will be correspondingly increased. For the field coils, $\frac{1}{2}$lb. of No. 20 on each pole-piece should be sufficient, or 3lb. in all, taking an exciting current of 2 amperes from the 12-volt battery. As regards the propeller for the wind motor proposed to use with this generator, straight grained Douglas fir is generally employed, and alternatively cedar may be used, well varnished after construction.

Running Motor on Acetylene Gas

REFERRING to your reply concerning an acetylene gas generator for petrol engines in the June issue, will you please answer the following questions:

(1) Is the inner carbide container a loose fit in the lid of the water container, allowing it to rise or fall, or is it a fixture?

(2) Can you give any approximate data as to what size generator would be required to run a $1\frac{1}{2}$ h.p. two-stroke engine for a given period?

(3) Is there any difficulty in obtaining calcium carbide at the present time?—A. Blackburn (Malton).

(1) The inner carbide container is a loose fit in the lid of the water container in order that it can be removed for refilling and cleaning. It is intended that it should remain in position when in use.

(2) The acetylene gas consumption per B.H.P. hour is about 7 cu. ft., and this is approximately the output of one pound of calcium carbide. A generator holding one pound of carbide would run an engine developing 3 B.H.P. for 20 minutes.

(3) Calcium carbide sales are restricted and we feel certain it will not be made available for road vehicles.

Rewinding an Electric Drill

I WISH to rewind an electric drill for 240 volt A.C., at 50 cycles. The fields are the usual 2-pole. The armature is $1\frac{3}{4}$in. diameter by $1\frac{3}{8}$in. long, and has 11 circular slots, and 33 comm. segments. The motor speed should be in the vicinity of 10,000 r.p.m., this being geared down to give a drill speed of 1,450 r.p.m. Could you give me a suitable winding specification?—George Wilson (Heaton).

THE winding specification recommended for your electric drill, with an armature $1\frac{3}{4}$in. diameter by $1\frac{3}{8}$in. long, having 11 slots and a 33-part commutator, running in 2-pole fields at 10,000 r.p.m. on 240 volt. A.C., will be as follows:

Armature: 33 coils each with 33 turns of No. 33 s.w.g. enamel and single silk-covered copper, grouped three per slot.

Fields: 2 coils, each with 400 turns of No. 28 s.w.g. enamel and single silk-covered copper, in series with one another and with the armature.

6-volt Dynamo as a Mains Motor

WILL you please give the following information? Is it possible to run a 6-volt motor-cycle dynamo as a motor off 200 volt D.C. mains, for grinding, etc.? In a back number of "Practical Mechanics" you gave details of a home-charging plant, using an electric fire in series with battery. I substituted the dynamo in place of the battery. Although it ran, it got warm very quickly, and developed only low power."—A. McQuillan.

IT would be possible to run any small 6-volt generator as a motor from the 200-volt D.C. mains by providing enough series resistance in circuit to limit the current to the same amount as previously loaded when working on 6 volts—provided the generator is designed with a commutator and brushes, and not intended to generate alternating current with one terminal earthed and the other in connection with a slip-ring. A.C. generators will not work on D.C. The objection to running low-voltage motors on the mains is twofold: first, the watts consumed are almost all wasted in the large series resistance; if it is a 6 volt 3 ampere-generator, for instance, the 3 amperes it requires to run as a motor, if taken from 200-volt mains, represents 600 watts consumption. Of this only 6 volts 3 amperes, or 18 watts, is usefully employed by the motor, the remaining 582 watts being wasted in uselessly heating up the series resistance. Apart from this the insulation of a low-voltage generator would hardly be likely to stand up to the conditions called for on a 200-volt circuit, and would be almost certain to break down.

Silvering Celluloid

I SHOULD be pleased if you could inform me how to silver celluloid to produce a mirror with a pliable, unbreakable base.—W. H. Greenland (Wimborne).

IT is not easy to silver celluloid, the results being unreliable. Professional silverers have some method of dealing with this problem, but their mode of working has been kept secret.

In your case there are two methods available for your trial and experiment, viz.:

(1) Smear a very fine film of white of egg over the celluloid surface and then lay down on it a piece of thin silver foil, subsequently pressing the silver foil down with a slightly warmed iron. An iron warmed by being stood in hot water is the best for this purpose. Quite a good silvering effect is obtained by this simple means, but the mirror properties of the silvered celluloid may not be good.

A better, but more difficult method is the following chemical method of silvering:

(2) Dissolve 60 grains silver nitrate in 1 oz. of water. Pour this solution rapidly into a boiling solution of 48 grains of Rochell salt in 1 oz. of water. On cooling, filter the mixed solutions, and make up their bulk to 12 ozs. with distilled water. Call this solution "Solution A."

Next dissolve 60 grains of silver nitrate in 1 oz. water, and add ammonia to it drop by drop until the copious white precipitate, which is first formed, is nearly (but not quite) dissolved. Then make up the solution in bulk to 12 ozs. with distilled water. Call this solution, "Solution B."

Solutions A and B must be stored in the dark, otherwise they will deteriorate.

For use, mix equal amounts of Solutions A and B in a perfectly clean dish, and immerse the celluloid article in the mixed solutions. A satisfactory silver film will be deposited within five minutes.

It is essential that the celluloid as well as all the mixing vessels, and even the fingers of the operator, be perfectly clean and grease-free, otherwise unsatisfactory results will be obtained. The slightest amount of grease obtaining access to the silvering bath will make the silver deposit patchy and non-adherent.

Removing Mildew from Linen

I HAVE a valuable linen cloth (which has a colour woven into it) that has become rather badly mildewed, and I am wondering if there is any means of removing this.—J. T. Scanlon (Leeds).

YOURS is certainly an interesting, but at the same time an exceedingly difficult, problem to deal with. Mildew stains are the fastest of all stains, for the living mould organism penetrates into the centre of the fibres of the fabric, depositing its colouring matter therein, which colour is usually very resistant to all but the severest bleaching agents. The problem is further complicated by two facts—first, that the linen cloth might be tendered or weakened by the action of a strong bleach; and second, that the coloured interwoven threads would almost certainly be affected by any bleaching action applied to the fabric.

If we were in your position we should, seeing that the cloth is a valuable one, seek the aid of Messrs. Pullars, of Perth, who have had extensive experience in the dealing with difficult stains. It is possible to remove a mildew stain by applying to it a certain type of ferment, which selectively attacks the stain before acting upon the fabric. The technique of using these ferments is more or less secret, and, of course, calls for great skill and experience. We feel, therefore, that, better than tackling the job yourself (and being sorry afterwards), your best plan would be to state the case to Messrs. Pullar and to send the cloth by registered post to them for their inspection.

You could, of course, soak the affected area of the cloth in warm citric acid solution, or in alum solution, and you could try the effect of scouring with a paste made up of chalk and powdered pumice stone applied very gently. Any bleaching treatment, however, is to be deprecated, since it will almost certainly attack the coloured threads of the material.

Iridescent Colours

I HAVE been trying for some time to reproduce the ever-changing colours as seen when mineral oil is floating on the surface of water, and again, as seen on the surface of an ordinary soap bubble. I remember seeing, some few years ago, an opaline glass globe illuminated within and showing different combinations of colours in ever-changing formations, somewhat similar to a kaleidoscope. My experiments so far have not met with much success.

Can you please help me or refer me to some book on this subject?—C. S. Gibbons (North Finchley).

WE are afraid that we can be of little assistance to you in the matter which you detail, since you do not inform us of the nature of the medium in or on which you are attempting to reproduce the iridescent colours of the soap bubble or oil film. These colours are, as you know, produced by the intereference of light rays, the oil film and the soap bubble producing the same effect in two different ways.

It is possible to render glassware iridescent by incorporating into it a minute amount of iron, lead or other metallic oxide, but the exact method of effecting this is secret. You may be aware of the fact that glass which has lain long buried in the earth generally becomes iridescent, owing to the gradual corrosion of the glass by various metallic salts in the soil.

In the absence of an orthodox muffle furnace capable of melting glass the only line for your experimentation which we can suggest is that you rub over the glass surface a quantity of hydrofluoric acid containing a small quantity of a lead salt, such as lead nitrate or acetate, in solution. The hydrofluoric acid should be fairly dilute, and immediately after its application to the glass the latter should be exposed to hydrogen sulphide gas, which will convert the traces of lead salt deposited on the glass into brown-black lead sulphide. If the lead salt is sufficiently diluted, and the hydrogen sulphide very sparingly applied, it should be possible to produce a semblance or iridescence on the glass, but, of course, the result will not be anything like as effective and as beautiful as the natural rainbow colours observed in the soap bubble or suitably-placed oil film.

You must bear in mind that hydrofluoric is highly corrosive, and that, since it dissolves glass, it has to be kept in gutta-percha bottles. It is obtainable from any firm of chemical and laboratory suppliers.

So far as we are aware, there is no English book devoted to the subject of rendering glass iridescent, but, nevertheless, you may find references to this subject in the many technical books which are available on glass technology, and which can usually be consulted in any good technical or reference library.

Ford V8 Producer Gas Plant

MY brother, who is a mining engineer working in Northern Rhodesia, is naturally finding difficulty in getting petrol for his Ford V8 car; but he can easily get charcoal and coal for a producer gas plant. He has tried writing to Australia and Durban to get a producer gas plant suitable for running a Ford V8 car, but he is unable to get one anywhere.

He has now decided to try to build his own producer gas plant, but he is doubtful about the way to cool the tuyeres. Could you, if possible, let me have any information on making a producer gas plant and/or let me know where I can get such information? I think you published something about it in "Practical Mechanics" some time ago, but most of my copies of "Practical Mechanics" have been sent for salvage and I cannot find anything in the few copies I have left.—B. Gordon White (Leeds).

IN reply to your query regarding the construction of a producer suitable for a Ford V8 car, has your brother in Northern Rhodesia tried to obtain one from this country? The Government Emergency Transport Producer can probably be obtained for export providing the necessary licence can be obtained. Contact should be made with the High Commissioner in London on this point, or perhaps an inquiry to the Mines Department, Dean Stanley Street, Westminster, may give useful help. Alternatively, one of the manufacturers of this plant, such as Neil and Spencer, The Crossroads, Effingham, Surrey, may be able to help you.

Regarding the possibility of making a producer, this would not be in the least difficult for an engineer, but the details required would be too great to give in anything like sufficient length in an answer of this sort. We would suggest that your brother obtained working drawings of the Government 5-therm Producer from the Mines Department (address as above), or obtained the licence terms from one of the other firms making such plants, such as Parkinson and Cowan, Terminal House, Westminster, or the British Coal Utilisation Research Association, 54, Victoria Street, S.W.1. One of these would, no doubt, be willing to grant a licence and provide drawings at a purely nominal fee.

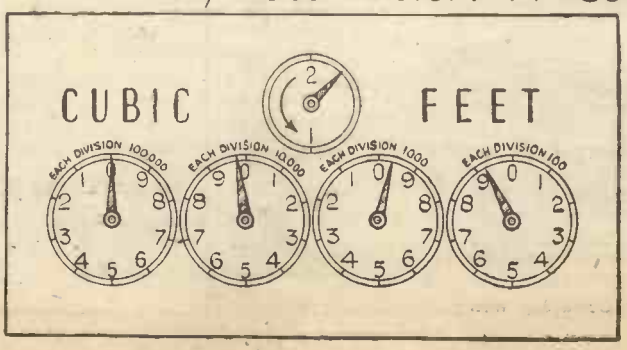
A suitable producer for a Ford V8 would have to be about 18in. diameter and 4ft. 6in. high. The tuyere would have to be 1in. internal diameter and water cooled. This is achieved by welding two tubes about 8in. long, concentrically, leaving a water space of ¼in.-⅜in. all round.

Water circulation is assured by a flow and return connection to a water reservoir, conveniently a car radiator, which provides atmospheric cooling. Both flow and return connections are made on the tuyere, outside the combustion chamber. The tuyere should, of course, be welded to a flange for easy removal and fixing.

The other units required for the plant would be an atmospheric tubular cooler for the gas, capable of being easily cleaned, through conveniently placed "manhole" covers, and a sizal grass filter, preferably two-stage, to facilitate cleaning and to reduce resistance.

In conclusion, we would strongly advise consulting the "Hartley Report on the Emergency Conversion of Motor Vehicles to Producer Gas," price 9d., from H.M. Stationery Office, which deals fully with equipment, operation and fuels for vehicle producers.

Dry Gas Meter: A Correction



IN the article on "The Dry Gas Meter," which appeared in our July issue, there is a slight error in the position of the pointer of the third dial. This pointer should be between the 0 and 9, as in the accompanying illustration, and not between the 0 and 1.

Notes and News

U-Boat's Rocket Engine

A NEW engine of the "rocket" type, said to be used by U-boats operating off the U.S. Atlantic coast, is described in the *Navy League Magazine*. The engine burns oil fuel when surfaced, and a mixture of hydrogen and oxygen when submerged, thus eliminating the usual electric batteries, and the danger of chlorine gas.

Distilling Water for Lifeboats

THE Ministry of War Transport is considering many inventions for converting sea water into fresh water for use in ships' lifeboats. Most of them are too heavy to carry, but one firm is now experimenting with a new type of distiller, designed to burn wood, even when soaked in sea-water. Under test conditions ashore this apparatus has proved capable of distilling 20 pints of water by burning the wood obtained from a boat's oar.

Mass-produced Cargo Boat

IF tank tests in the United States are successful, mass production may soon start in Washington on a 250ft. long cargo boat that could be built in six weeks from strip steel plates. Plans have been drawn up under the direction of Commander Hamilton V. Bryan, of the U.S. Navy.

A "Tall Story"

NOT all would-be aviators who pass through the flying schools of Flying Training Command are born fliers. In fact, some, judging by the comments of their instructors, are "a bit dumb"—but always polite.

A famous instructor, now a group captain who has a great record of bombing raids over Germany, tells this story of one of his pupils:

"I told him to take-off, climb to a thousand feet only, and then fly straight and level. Up he went. We got to a thousand feet, and still we climbed. I didn't say anything but waited. We passed two thousand feet, and were well on the way up to three thousand. Then I leaned towards the speaking tube and asked him, 'What height are you?' Back came his reply in a flash—'Five feet eight and a half, sir!'"

R.A.F. personnel studying the controls of a Mustang single-seater, at a technical training school in the North-West of England.

THE Cyclist

Editor: F. J. CAMM

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All letters should be addressed to the Editor, "THE CYCLIST," George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Phone: Temple Bar 4363
Telegrams: Newnes, Rand, London

Comments of the Month By F. J. C.

Proposed New Cycling Organisation

THE much discussed Llangollen-Wolverhampton Massed Start Road Race which took place a few months ago resulted in the N.C.U. suspending a number of riders who took part in it. In spite of the fact that the N.C.U., refused to grant a licence to the promoters the race was held with, it is stated, the active co-operation of the police, and by permission of the Chief Constable of Wolverhampton.

Certain riders feel aggrieved over the attitude of the N.C.U., and a Wolverhampton Club called a meeting on July 12th for the purpose of forming an organisation to control cycling sport. Apparently it was the intention, in forming this new organisation, to cater for and provide the suspended riders and their supporters with Road Time Trials. Certain rules have been proposed. It is suggested that the new organisation be called the "Midland League of Racing Cyclists"; that all cycling clubs in Staffordshire, Shropshire, Warwickshire, and Worcestershire be eligible to join. The object of the league is to encourage and control all forms of amateur and professional cycling. They define an amateur as one who has never competed for a money prize, or monetary consideration, *and* who shall not permit his name, performance, machine, or equipment to be used for advertisements. A professional is one who competes for a money prize, or monetary consideration. Regarding the latter, nothing is said regarding advertising, and under this rule, therefore, an amateur who does not compete for a money prize, or monetary consideration, but allows his name, performance, and/or machine, or equipment to be used for advertisement is left in the air; he is neither a professional nor an amateur.

The annual subscription has been fixed at 5/-, with an annual registration fee of 1/- per member for those competing in open events. Clubs which become affiliated will be allowed one delegate for every ten members, but only one registered member will be allowed to attend any meeting of the league.

The officers are to consist of chairman, vice-chairman, secretary, assistant secretary, and treasurer. Nothing is said about a committee.

For all road races other than unpaced events, police permission must be obtained by the league, and the rules of the road strictly observed and all police instructions obeyed without hesitation.

Sufficient Governing Bodies

NOW there are a sufficient number of governing bodies connected with cycling for it to be unnecessary to form another, and we do not think it is in the best interests of the sport for a new organisation to be formed because some members of the N.C.U. are in dispute with that body. The rules of every organisation provide for such disputes, and the machinery for listening to the evidence, and for the case to be tried by the membership itself. Any member who can gain sufficient support can call a special general meeting. On the other hand national bodies, like local clubs, have a right to suspend or expel a member for any conduct prejudicial to the interests of the club, if he fails to justify the charge after having been called before the committee. It seems to us that in this case the disputant members could have called a special general meeting of the N.C.U., for if their views are generally held the matterl could have been rectified by a general special meeting. The calling of such a meeting would have entailed far less work than the formation of a new body. The policy of forming a new club every time there is a dispute can be a many-headed chimera. It is, indeed, inviting trouble, and may well recoil upon the new organisation. For example, the latter has made rules which presumably it will rigidly enforce. Suppose a member of it feels aggrieved. The founders of the new organisation cannot complain if that member breaks away and forms yet another organisation. Such procedure does not strengthen the cycling movement, it weakens it. The membership has the necessary power to rectify the policy of a club if that policy does not conform to the wishes of the majority. The minority must accept the majority verdict. If the minority break away and form another club there would be hundreds of organisations, and the greater the number of organisations, the less would the power of each be, until finally no organisation would be able to exercise national control.

The Umpire's Decision

IF you appoint an umpire, you must accept his decision. A good sportsman accepts the decision with good grace, even though he may disagree with it. As we have said, there are sufficient cycling organisations to cover the various aspects of the sport and pastime. Some may, indeed, think there are too many. It seems a pity that the present time should be selected for a dispute of this nature. We understand that goodwill has been shown in the matter by the N.C.U., and that some suspensions have been expunged. Let us hope that even now the parties may get together and find some useful solution to what is, in reality, a small dispute.

Suspended Riders Reinstated

OF the suspended riders, Messrs. Angrave, Clements, and Tall were found not guilty under the mass-start rules of the N.C.U. Messrs. Hickman, Turner, Beeson, Finn, and Morgan, as well as all others who entered, competed, or officiated in the race were warned as to their future conduct, and informed that any further offence would be punished with the utmost severity in accordance with the rules of the Union. Only eight of the riders and officials who took part in the Llangollen to Wolverhampton Road Race on June 7th attended the Emergency Committee Meeting, which was held under the chairmanship of R. Taylor at Birmingham.

Bicycles for War Workers Overseas

OWING to the lack of petrol in the British Empire and neutral countries the Board of Trade has sanctioned the manufacture of 300,000 bicycles in Britain this year to meet the definite war requirements of overseas territories.

"Petrol restrictions apply overseas as much as they do here in Britain," Mr. H. R. Watling, director of the cycle manufacturers' organisation, said to an interviewer. "The need for transport by bicycle for munition workers and for the essential war services of overseas territories is consequently as great as it is with us.

"The total figure of 300,000 includes components; and during the war only essential repair parts for users of British bicycles will be sent to countries in the Western Hemisphere, where the number of British bicycles has been growing steadily for years. We are, of course, sending out such spare parts with the knowledge and approval of the Lease-Lend administration.

"Naturally, we cannot to-day send overseas anything like the number of bicycles exported before the war, but arrangements have been made to ship as many as possible to South Africa, India and New Zealand. The other parts of the British Commonwealth have not been forgotten, and we are also meeting the requirements of territories served by the Middle East Supply Council, which include Egypt, Iran, Iraq, Lebanon, Palestine, Syria and Transjordania.

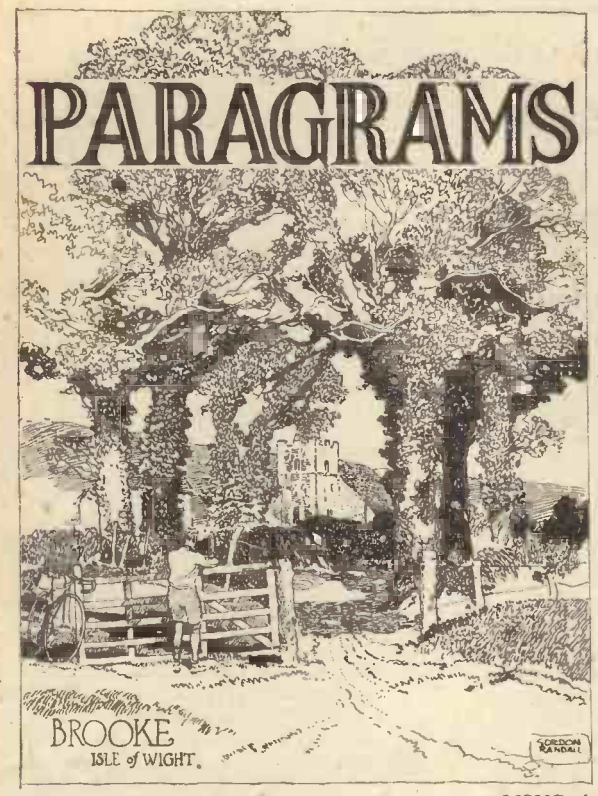
"No tribute to the popularity of the British bicycle could be finer than the present demand from the Dominions, Colonies and neutral countries which has led to the agreement by our Board of Trade to the programme now sanctioned."

Portsmouth-and-Back Record

GEORGE LAWRIE and Ranson Morford, of the Viking R.C. and South Western R.C. respectively, broke the London-Portsmouth-and-back record in 7 hours 1 min. 52 secs. in June. This is the first R.R.A. record since war started.

Frank H. Farrer

ON June 30th Mr. Frank H. Farrer, managing director of the Villiers Engineering Company, Ltd., completed 40 years' service with this company. It is a long record, and all who know Mr. Farrer will understand something of the untiring energy which he has expended in helping to bring this business to its present position.



Over Forties

EARLY autumn time-trials include the provision, by the Upper Holloway Cycling Club, of a 12-hour trial for men over 40 years of age.

Trooper Harris

REG. HARRIS, crack Manchester rider of a decade ago, is now a Trooper in the Middle East.

An Authority on Cycling Leaves £21,021

THE late Mr. A. W. Rumney, one of the greatest authorities on cycle touring, left £21,021.

Sprint Champion in S.A.

PILOT OFFICER BILL MAXFIELD, Empire 10-mile champion and British Sprint champion, is with the R.A.F. in South Africa.

Redmon Hon. Sec. Missing

RICHARD BENSLEY, former hon. sec., Redmon C.C., who was third in the North Road "12" of 1940, has been posted as missing. He was in the Royal Navy.

In Tandem

SECRETARY of the Atlas Cycling Club, W. H. Elliott, has married Miss K. A. Steedon, another keen rider.

Open Door to Open Events

MEMBERS of the Century Road Club are now permitted, should they so desire, to compete in Open events. The club still adheres to its policy of not promoting club time-trials.

Back to Blighty

AFTER fighting experiences in Hong Kong, Malaya, Java and other parts of the Far East, H. A. G. Keats, Oxford City Road Club, has reached this country.

Keeping in Touch

MEMBERS serving with Forces always appreciate club magazines. Crouch Hill C.C., now in its 62nd year, sends a two-page news sheet to each member each month.

Saving Metal

CERTAIN prominent clubs promoting Open events are awarding certificates in lieu of medals and prizes and handing any balance from entries (after expenses have been met) to the British Red Cross.

Distinguished Service

AN enthusiastic member of the Ramsgate and District C.C., Reg. Surman, serving with the Royal Navy, has been awarded the D.S.M.

Well Established

WITH an active membership approaching 50 Henlow R.A.F. C.C. is now well established. Great North Road speedmen have reasons to recall the speed-soaked lanes of Henlow in final stages of "12's" and "24's."

Tallest Road Cyclist?

FRED KEATS, Finsbury Park C.C., is probably the tallest man in the road game; he is 6ft. 5in.

Congratulations

FLIGHT-LT. W. G. BARNES, D.F.C., the Charlotteville C.C. massed start expert of pre-war days, is the proud father of a bonny son.

Silchester's Loss

MEMBERS of Silchester C.C. mourn the death of a fellow-member, F. W. Barrett, who was killed in a raid.

Fighting President

THE president of the Brimsdown Rovers C.C. is Sergeant Air Gunner E. F. C. Cowper.

Best Wishes

A PROMINENT pre-war member of the Tees-side Road Club, Pilot Officer F. J. Ford, has married Miss Ivy Askman. Former assistant secretary of the club (Pilot Officer K. Gate) was best man.

Glade C.C. Revival

STEPS are being taken to revive the Glade C.C. In pre-war days it was an influential Eastern Roads club.

Carrying On

EVEN though it had to postpone its Golden Jubilee celebrations last year, Gloucestershire City C.C. is holding its own despite depleted membership.

W.S.C. Member Missing

AMONG those now known to be missing following the fall of Singapore, is Lance-Corporal Albert E. Williams, Suffolk Regiment, of the Wings Sports Club, Barking, Essex.

Young Time-trials Sec. Also Missing

ONLY 22 years of age, G. Rough, active pre-war time-trials secretary of the Johnstone Wheelers, has been posted as missing. He joined the Royal Navy in May, 1940, and within a year was a qualified rear-gunner attached to the Fleet Air Arm.

New Ladies' Record

BY clocking 1h. 6m. 17s. in the Birchfield Girls' "25," Miss E. E. L. Jordan, Addiscombe C.C., created a new competition record for her sex at that distance.

With the R.A.M.C.

W. FRANKHUM, president of the North Road C.C. and former National Treasurer of the R.T.T.C. is now in the Royal Army Medical Corps.

An R.R.A. Record Lowered

GEORGE LAWRIE, Viking C.C., and Ransom Morford, South Western Road Club, have lowered the first R.R.A. record since the outbreak of war. On a tandem tricycle they rode from London to Portsmouth and back in 7hrs. 1m. 52s., beating the previous best—set up in 1927 by Bert Houghton and Tom White—by more than 28 minutes. White timed the event.

Killed In Action

A SPECIALIST in long-distance touring, Sergeant Pilot Albert Douglas, Nottingham C.T.C. member, has been killed in action. He was formerly a member of the Broad Oak Road Club; holder of that club's 24-hour record and joint holder with Arthur Bailey of the club's Nottingham-London-Nottingham record.

Twice Torpedoed

CLUB members home on leave have often interesting stories to relate. Take the case of Jack Fergusson, Musselburgh C.C., who is with the Fleet Air Arm. He was on the *Ark Royal* when she sank, and when on the way home from Gibraltar was again torpedoed, spending five hours in the water before being picked up.

News Awaited

PORTSMOUTH North End C.C. members anxiously await news of Bernard Pearce, one of their prominent pre-war stalwarts, who has been posted as missing following the fall of Singapore.

Mobile Home Guards

TYNESIDE cyclists are enrolling in a special cycling unit of the Home Guard.

Bishop Back to Bicycle

FORMER Bishop of Willesden, Rev. Guy Vernon Smith, now Bishop of Leicester, states in his diocesan leaflet that he is reverting to cycling. The 60-year-old Bishop adds: "As a bishop's habit is not designed for cycling I shall wear ordinary clothes."

Void Trial

ONE of the very few open road time-trials to be declared void—an over-eager helper mistook the correct point in a turn—the Upper Holloway "30" may be run later in the year.

Watch Him!

D. K. HARTLEY, Dukinfield C.C., has scored many fast times in short distance events this season. In Manchester circles his rides in longer distance events are being watched with interest.

From Race to R.A.F.

FRANK STAPLEY, Finsbury Park C.C., is with the R.A.F. The day before he joined up he rode in his club's inter-club "50" with the Southgate C.C.

The Swales Brothers

SERGEANT PILOT H. SWALES, Yorkshire Road Club, has been killed in a flying accident. His brother, Jack, also a Yorkshire Road Club member, has been wounded while serving in the Middle East.

Speedman to Spotter

R. POSTLETHWAITE, Sheffield Phoenix C.C., is now a Sergeant Observer in the R.A.F. He was a prolific speedman just before the war.

Money Melts

READ this on a hot day! The cost of snow-clearing in Aberdeenshire last winter was £37,000 (compared with £30,000 for similar work the previous year), or equal to 9d. in the £ on the rates.

Lancashire Veteran Dead

LANCASHIRE lost one of its most noted veterans when, at Heywood, Charles Turner died in his 90th year. At 69 he took second prize in a veteran's race.

Good Going

THE 30-mile Team Competition record was broken by J. Simpson, A. W. Martin, and H. Bailey (Barnsley C.C.) when they clocked 3h. 50 m. in the Sheffield and District "30." The club also filled the first four places and secured 1st handicap award. It was the first Open "30" in the district for 11 years.

Missing Over Germany

FOLLOWING a bombing raid over Germany, Len Howe, Marlborough C. and A.C., has been posted as missing.

'Phones at Hostels

THE Scottish Y.H.A. is trying to equip all its youth hostels with 'phones.

Apples for Tea?

A NOVEL attraction of the new youth hostel at Killin, Perthshire, is an orchard in the garden.

Signposts

SPEAKING in the House of Lords recently, Lord Brabazon said that it was time we had the signposts back.

Brigadier on Bicycle

A BRIGADIER in the transport department of the Northern Command travels to work, a distance of eight miles, by bicycle.

Doubled Membership.

AT the end of June, Glasgow membership of the Scottish Y.H.A. was over 13,000, double the figure for the same month last year.

Running After Bicycles!

OSENDORP, former Dutch running champion and now a Nazi, is reported by Free Dutch circles to have gained employment to pursue and catch bicycle thieves in Holland.

Another One!

YET another electric bicycle has been invented, this time by a Frenchman in St. Nazaire, says Stuttgart Radio. The machine is stated to have three gears and to be capable of a speed of 60 km. per hour.

Carried Live Shell in Bag

AN Aberdeenshire youth, who cycled 16 miles with an unexploded shell in his saddlebag, caused something of a sensation when he handed over the shell at county police headquarters, Aberdeen. He found the shell on the beach at Collieston, near Ellon, and placed the shell, which was 16ins. long, in the bag.

On his way to the police station he rode through some of Aberdeen's main streets.

Prison for Cycling

ANYONE riding a bicycle in Albania is now liable to get anything up to 10 years' penal servitude, reports Moscow radio.

Novel Excuse

WHEN a Girvan, Ayrshire, farm worker was before the local court on a charge of stealing a bicycle, he gave the novel excuse that he took the machine when walking because he "felt tired." Sentence was deferred.

Around the Wheelworld

By ICARUS

Cars at Time Trials

I UNDERSTAND that a watch will be kept on time trials to ensure that petrol is not being misused, and I gather that it is not a legitimate use of petrol for a car to be used for the transport of marshals, competitors, timekeepers, etc., on such events. It will do the sport a great amount of harm if prosecutions are brought against cycling officials who use their cars in this way. This may seem harmless, but it is necessary for petrol supplies to be conserved for really essential duties. I mention this because one or two editors of club journals with a flair for giving unimportant details have mentioned that cars have been used for this purpose.

Emergency Committee Meeting

AN Emergency Committee Meeting was held by the N.C.U. at the White Horse Hotel, Congreve Street, Birmingham, on Saturday, July 4th, when A. A. Dodson, W. W. Kirby, R. Knight, J. Kremmers, P. Robins, A. W. Weiringen, E. Humphries, C. Harrington, C. Thornycroft, F. Hayward, R. Salter, and P. Pitchford were called upon to explain their participation in the Llangollen to Wolverhampton mass-start race on June 7th, a race organised by Stallard, whom the N.C.U. have suspended *sine die*. After hearing the evidence the riders were warned, and if they participate in any mass-start races in future on the road they may be suspended. At the moment of going to press we understand that Stallard has not applied for reinstatement, and thus is still suspended by the N.C.U.

Now, I understand that this much-discussed mass-start race was run with the active co-operation of the Chief Constable of Wolverhampton, and whilst discussions have chiefly revolved around the question of the N.C.U. and its rules, no one except the Editor of this journal has raised the important question whether such road races are illegal. In recent litigation a witness explained that Opens were known as time trials—races against the watch—and not as races. Lord Justice Goddard stated that if they were races they would be illegal. Now it seems to me that someone should take this matter up with the Home Office to obtain a ruling. Stallard apparently gave an undertaking to the police that he would run his mass-start race in strict accord with the rules of the road. Can you run a race in accord with the rules of the road if a race itself is illegal? Have the police power in any case to interpret the law and advance such decisions? I imagine that large numbers of would-be promoters of mass-start races eagerly await answers to these questions. If it is legal it is possible that someone at some time will obtain the permission of the Commissioner of Police for the Metropolis to run a mass-start race round London starting from the Mansion House, using the useful argument that the Chief Constable of Wolverhampton has granted permission for such races.

The fact that Stallard's race was run for charity does not answer the point. You may give £100 to charity out of your earnings, but you still have to pay Income Tax on the amount. These are points which ought to be cleared up, and I am somewhat surprised that critics have been more concerned with the domestic side of the matter than with the legal side. Therefore, I suggest that the matter be taken up with the Home Office at once.

The Fast Hour at Paddington

FRANK SOUTHALL, who achieved so many successes in tandem-paced racing, covered 31 miles, 1,457 yards, when he captured the National Record in 1929. George Fleming, at the Paddington Track in a recent attempt to beat it, covered 30 miles, 770 yards. It was a brilliant performance. Fleming, of course, holds the French one-hour record at the Paris Indoor Track.

Cycle Valves

CYCLE valves which involve the use of less rubber and less metal have been introduced by the Dunlop Rubber Company. The valve is attached to the tube in a manner similar to that which has been proved satisfactory on motor vehicles. The rubber covering the valve is vulcanised to the metal, and the rubber base is vulcanised to the tube, ensuring perfect air tightness and disposing of the need of a base nut. This new valve involves a small alteration in the fitting of tubes. The final stage of the fitting should be located a few inches from the valve. Before pushing the last few inches of the wired edge of the cover into position, push the valve up into the cover to ensure that the tube is not flat, and then complete the fitting. After completing the fitting pull the valve down into position before proceeding with inflation.

John William Bryan

"BRYAN OF THE B.S.A." died on Sunday, June 14th, in his 66th year, and the industry of the bicycle loses one of its most virile leaders. Unfortunately, J. W. B.—as he was affectionately known in trade circles—had been ailing in health for a couple of years, and had semi-retired from the daily work at the big factory which had been a kind of spiritual home to him for 33 years.

J. W. Bryan saw the light of day near Bourne, in Lincolnshire, was brought up in Methodist circles (for his father and grandfather were both local preachers and lived to great ages), and undoubtedly this early training in conduct formed the foundation of his business dealings, and won the probation of thousands of friends he made in the course of his career.

John William Bryan.

He went to the B.S.A. Co., Ltd., in 1907, after serving his apprenticeship as a printer, followed by considerable advertising experience; three years later took over B.S.A. publicity, followed soon after the close of World War One by sales management of cycles, motor-cycles and wireless, and finally in 1934 was elected a director of B.S.A. Cycles, Ltd., a position he still filled at the time of his passing.

On the business side of his life J. W. B. steadily gained the confidence and often the affection of his contemporaries, for while he could not suffer fools gladly, he was ever fair and frank, and grew in stature to be a great servant of the firm whose trade mark he wore as his coat of arms.

Many Activities

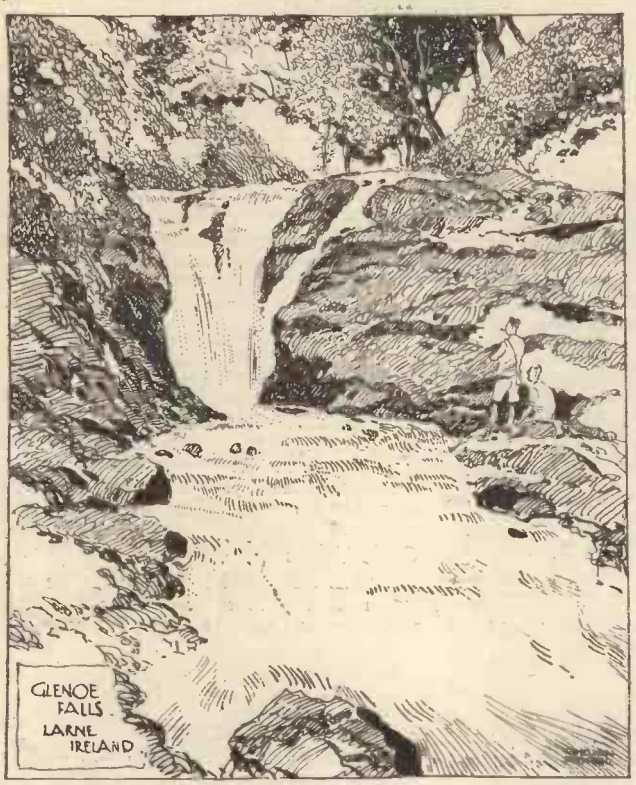
Socially he was delightful, the embodiment of a modern John Bull; and his work on behalf of the Midland Centre of the Motor and Cycle Trade's Benevolent Fund, of which body he was chairman during the last three years, was outstanding in the matter of dignity and individualism and for the kindliness to the less fortunate which was one of J. W. B.'s charming traits.

At the time of his death he was president of the Cycle and Motor Cycle Union, and that important body loses a forceful leader whose personality had impressed opinion on its gatherings for many years.

J. W. B. was a friend to all cyclists, for deep down in him he understood how much the sport and pastime meant to the present generation, and should mean to the teeming millions coming after them. He was a busy man, possessing a mind sparkling with notions which he occasionally would spill for one's edification during those intimate talks which one remembers now with quiet happiness.

There is some talk of a memorial tribute to a "gentleman of business," and one hopes it will eventuate.

J. W. B. leaves a widow, a daughter (Mrs. Janes, who married the son of a B.S.A. colleague, Mr. Walter Janes), and a tiny granddaughter, and to them we offer our genuine sympathies in the loss of a husband and parent who might so easily have looked forward to a sunny autumn after the long season of work.—F.J.U.



Cyclorama

By H. W. ELEY

Cycles for Wounded R.A.F. Men

IT was grand to see the ready and big response to the appeal first made by H. T. Bates, of Bates Cycles, Ltd., for second-hand bikes for wounded R.A.F. men. In certain stages of convalescence, what could be better than a bike to help towards a complete restoration to health? Those who know how good a thing cycling is to restore health and build up steady nerves after illness will appreciate how welcome have been the machines already sent in, and will hope that the gallant men of the R.A.F. will get many more bikes, and find them good "medicine."

One of the "Old Brigade"

I TALKED with one of the real stalwarts of the old days recently—Bob Carlisle, who had the distinction of riding in the memorable cycle race in 1889 when the pneumatic tyre first demonstrated its superiority over the old "solid." The event took place at the Queen's College Sports, at Belfast, in May, 1889, and "Bob" (who still works at Fort Dunlop despite his seventy odd years) well remembers the stirring victory of William Hume, who only died quite recently. Bob has seen the Dunlop concern grow from small beginnings into the giant unit it is to-day, and his recollections of the early days are entertaining indeed. He is one of the "old brigade" who ought to write a book for the delectation of the present generation. And if Bob can write as entertainingly as he can talk, it would, I predict, be a "best seller."

"Suffolk Scene"

TALKING of reading, I have just re-read a book which I warmly commend to all who love England and the English scene—and particularly to those discerning tourists who love Suffolk. The volume is "Suffolk Scene" and its author, Julian Tennyson, is a great-grandson of the poet. I know that many cyclists with an intimate knowledge of England would not place Suffolk very high up in a list of the best of our counties—there would be more votes, I vow, for Devon, and Sussex, and leafy Warwickshire, with many cast for Cumberland and Westmorland; but those who know Suffolk—*really* know it—usually love it, and I have never yet met with a better interpreter of its charms than Julian Tennyson. Get the book if you would live again your pleasant rides in the country of Constable and Gainsborough, and renew your memories of such pleasant places as Long Melford, and Clare, and Bury St. Edmunds. Blackies are the publishers.

A Cottage Garden

AS I write, I am looking through a window on to a cottage garden, and the border is glorious with lupins—mostly of the good old "haze blue" colouring, but some are the newer pink and yellow varieties. They make a great showing, and among them are patches of flaming red poppies. The grass of the lawn has been newly cut, and the scent is sweet indeed—almost as good as the scent of new-mown hay—and there is surely nothing in the whole world better than that? My cottage garden contains, too, some of the old-fashioned roses—boasting beauty as well as scent. I am afraid that many of the new varieties, despite the glamorous descriptions of them which appear in the florists' catalogues, do not fascinate me as much as the old favourites. But maybe I am old-fashioned myself in this respect; I think I am, for, turning to the world of dogs, I find myself preferring a mongrel to a pedigree dog, and I will always maintain that the mongrel has far more intelligence! Why, even as I write this, I can see Toby (a little fellow of mixed parentage if ever there was one) cocking an eye, and wagging a tail as if to endorse what I say and think!

Rubber Salvage

IT is natural, and good, that cyclists—tyre users all—should wish to play their part in the great national campaign for the conservation of rubber. And there is much that they can do. Those old covers, taken off the bike months ago, and now hanging in a shed—they are needed for salvage! And those old tubes too. Every bit of rubber that can be used again is wanted, and cyclists will not fail in their duty in this regard. And remember that tyres must be made to last as long as possible. That old bug-bear of "under-inflation" must be watched, and, fortunately, the cyclist has only to pay heed to a few simple rules to make his tyres give of their best, and perform long service. "Inflate hard" are the magic words which appear on many covers. Take them as a war-time order, and do not run tyres "soft."

The Shrew-mouse

RIDING along a Warwickshire lane the other day, I came across two boys examining the body of a small furry creature and speculating as to what animal it was. It looked like a mouse, but had a "snout" unlike the nose of any mouse with which they were familiar. It was not a vole, nor yet a mole. I dismounted and joined in the little natural history lesson—and was able to identify the little "fatality" as a shrew-mouse. Followed quite a "nature study" lesson, with a friendly talk about the smaller creatures of the English countryside. I was able to explain that in olden days the timid little shrew-mouse was held in awe and detestation, for it was an animal supposed to possess evil attributes, and cause the deaths of cows and sheep if it happened to run over their bodies. Whether this was due to the fact that the shrew-mouse gives off a peculiar odour I do not know. But I do not think the shrew-mouse is such a villain—he eats a lot of insects and grubs, and plays his useful part in the economy of nature and the fields.

"Faed" Wilson

I HAVE mentioned one "old-timer" in these notes, and will mention another, for recently I heard from that famous pioneer and lovable personality "Faed" Wilson. His letter came to me from somewhere in the Cotswolds, and I gathered from a short and pleasant correspondence I had with him that he was fit and well—despite a ripe old age. What memories his name brings back! Cycle racing; great work for the Cycle Trades Benevolent Fund; the earliest days of Dunlop publicity—"Faed" was in at the very beginning of the advertising of Dunlop tyres. One of the best of all writers on cycles and cycling—and a lovable man. Salute to "A. J."—still going strong, and, I doubt not, loving the rolling roads of England as deeply as ever.

Benefits of Cycling

WE are all cyclists these days! Riding to work one day recently, I was overtaken by the managing director of a famous Midland firm—a man of some 60 years. We rode together for a mile or so, and I asked my friend whether he still kept a car. "Car?" he asked with a smile, "why, that went a year ago. And, by the way, cycling to work has done something for me which bottles of medicine, and visits to spas, never did—I've lost my middle-age spread!" So the good work goes on, and the benefits of cycling are enjoyed by more and more folk every day. And, where there's a wheel—there's a smile.

Rabbit Keeping

I HAVE previously mentioned how successfully and enjoyably cycling can be linked with other hobbies and pastimes, and at Whitsuntide I was reminded of this fact by the sight of some happy holiday riders who were busy searching the hedgerows for herbs and edible wayside plants. I talked with two of the party, and discovered that they were . . . not exactly enthusiastic botanists, but very enthusiastic rabbit-keepers! Yes, they had become "back-yard food producers" in Britain's civilian army, and they were filling satchels with such homely plants as groundsel, hedge-parsley, sow-thistle, plantains, and dandelions. How my mind raced back to boyhood days, when I kept my "Belgian Hares" and "Flemish Giants" and symmetrically marked "Dutch" in those home-made hutches, and found their chief foods (in summer time, at any rate), in the tangled hedgerows of my native Staffordshire! Quite a long and interesting chat I had with those rabbit-keeping cyclists, and I left them convinced that they, at any rate, would not go short of a meat meal if the butchers' stocks gave out, for they assured me that they were only interested in "bunny" from the strictly utilitarian point of view.

A New Bicycle Every Year!

How Manufacturers Can Take Full Advantage of Post-war Conditions

By W. J. M.

THE British cycle industry will have to make a considerable adjustment in its attitude towards cycle design if fullest possible advantage is to be taken of post-war conditions. While we cannot possibly forecast those conditions in detail, it seems reasonably certain that the position will be that (a) the cycle manufacturers will be in possession of considerably augmented plant and resources as a result of their war-time activities, and (b) that there will be an enormous, although temporary, demand for new machines to make good the war-time wastage . . . a wastage at present going unchecked because of restrictions on supply.

Given (a), the cycle makers will make short work of coping with (b), but what follows?

After expanded plants have satisfied the demand for the replacements necessitated by several years of restricted supply, there will be only the normal, pre-war trade.

Will this be sufficient to keep the trade going in its expanded state? When you consider that before the war the progressive manufacturers had to cultivate an extensive export trade in order to keep their plants producing at capacity, and that this export trade may be considerably diminished after the war by reason of the growth of industry in hitherto agricultural countries, it is reasonable to assume that the home trade, as it existed before the war, will certainly be a long way short of sufficiency.

Export Trade

So problematical is the whole subject of post-war export trade that it would be a waste of time to discuss any possibilities in that direction. But there is nothing to stop the trade from considering, and considering now, what can be done to stimulate the home demand for what always has been, and will certainly continue to be, the finest bicycle in the world . . . a British made bicycle.

Purchasers of bicycles in pre-war days can be roughly grouped into three classes—(a) the youngster presented with his first machine, (b) the same youngster buying his first adult machine and (c) the adult converted to cycling, whether for utility or pleasure.

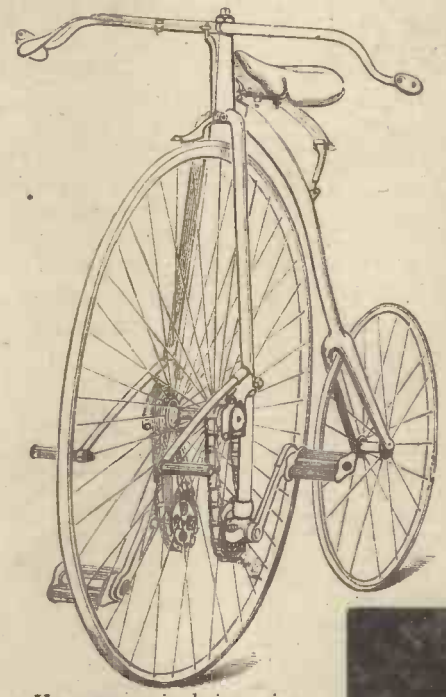
There is actually a fourth class—the rider buying a replacement bicycle to replace a discarded bicycle. But isn't it a fact that this class is so small that it could almost be disregarded? Who replaced a bicycle before the war? The average machine, once bought, lasted a lifetime, calling only for replacements of such wearing parts as tyres and chains. The only extensive buyer of new bicycles was the club rider, the majority of whom probably invested in a new machine every year of their active (say three to five years) club life, and even if they numbered a hundred thousand, what were they among the estimated twelve million cyclists in this country?

But when we come to consider how the home demand can be stimulated, it is this fourth class that must be considered . . . for there is a natural limit to our (a) and (b) classes, and the collective advertising of the cycle trade, just before the war, was rapidly pushing class (c), the converts, up to its maximum potential.

How can cyclists be made to replace their machines more frequently? An easy answer would be "cheapen the quality so that they wear out more quickly," but this is a policy which will never commend itself, I hope, to any British manufacturer.

No, the answer is to continue to improve the bicycle so that cyclists will *want* to buy a new bicycle every year.

Impossible? Not at all—the motor trade has shown how it can be done with a semi-



Has progress in design—since the model above—been consistent with demand? Modern conditions necessitate a break-away from the stagnant ideas of the past.

luxury item costing several hundreds of pounds. Can you envisage a motor-car manufacturer turning out the same car every year for say ten years on end, changing only its colour and the pattern of the brake lever? No, the necessity for keeping plants working at something near full capacity, in spite of the comparatively limited number of people able to afford a car, meant employing a design staff capable of turning out a radically different car almost every year in an endeavour to make every car owner buy that new car every year.

New Designs Wanted

In the cycle trade, design, except for the matter of details, has been static—almost stagnant—for many years. But it need not have been so. Already, in the few years before the war, there were signs that increasing competition was forcing the bigger manufacturers to explore the possibilities of radical changes.

There is no reason why a firm should not produce a new design of bicycle, if not every year, at least every two years, a design so different that it definitely dates its predecessor; so much more modern that a large percentage of riders will become dissatisfied with their "last year's model" and will invest in "this year's."

Neglected Features

To minds accustomed to accepting the static design of bicycle it may seem impossible that really radical changes can be made, but is it so? Just before the war we were treated to some revolutionary developments in lighting and gearing—two much neglected features of bicycle design. There is still plenty of scope. Frame design has crystallised out into the standard diamond frame—but there are an infinite number of variations which could be tried out, especially if the public were first shown that even the accepted riding position was not necessarily obligatory.

The many lessons which have been learnt in the correct handling of light alloys by the design staffs on aircraft work will not all be wasted, surely? Nor, we hope, will the enormous amount of research into the problems of air resistance.

Problems there will be in plenty, but nothing will be settled if we adopt an ultra conservative attitude, and refuse to admit that our present-day bicycle is not the last word. It is far from it—and any cycle manufacturer who actually cycles to any extent will admit it. After the war he will have his opportunity, in a world of change,

Petrol restrictions are giving the bicycle its greatest chance. Lord Provost Nimmo is seen above with his wife turning the restriction to good account by returning to cycling after a break of six years.

to make many necessary changes, and manufacture, to his own profit and the riders' increased pride of ownership, a *really new* bicycle every year.

WAYSIDE THOUGHTS

By F. J. URRY

War-time Touring Experience

A FRIEND of mine has recently returned from a spring tour of ten days—he is a retired individual—and tells me that accommodation is not too bad providing you seek shelter in the early evening, and so give the smaller places a chance to serve you before their bedtime. He says that it would be ridiculous to give up "straight" cycle touring, i.e., changing your accommodation every night, because there may be an occasion when several enquiries are necessary before you find bed and breakfast; and I quite agree. He had been to the south-west area. My only touring experience this year has been in Wales and the Welsh borderland, and I had very little trouble in finding accommodation. He recommends tourists to carry some rations, and found that many of the places he stayed at were quite glad he could supplement their own supplies of sugar, tea, bacon and cheese, rations that can very easily be carried in the touring bag. Unless special arrangements are made in advance, he thinks a larger number than a couple would be likely to meet greater accommodation difficulties; and again I am inclined to agree. In effect this means that a family or club party would be wise to fix a central spot from which daily runs can be undertaken; and, actually, this form of cycle touring is generally the cheapest and often the most convenient. But I confess I like the straight tour best, the journey that goes wandering round the shires, when you do not know quite where you will drop anchor for the night, and often do not care so long as the bed is clean and comfortable, and the food sufficient. The point to remember is that this is a very friendly land if you approach its inhabitants in a friendly spirit, seeking help for your needs rather than demanding service.

The Shortage

WHEN the announcement was made that basic petrol rationing would cease at the end of June, I was inundated with enquiries for bicyles, the type to buy and where they could be obtained, and thought in my ignorance these questions would disappear in a week or so. But they have grown greater as the calendar tabs have disappeared, and to-day dozens of people claim my acquaintance in the hope I may be helpful in obtaining the goods they need. People stop me on the way home to make enquiries, and seem to be most disappointed when I fail to be helpful. The fact is that the general public did not, or would not, believe petrol would cease as far as pleasure motoring was concerned, and actually could not conceive that bicycles would be short in supply, and those accessories of equipment, such as speed gears and lightweight tyres, would disappear. Now thousands of folk will be disappointed; and, candidly, I see no hope of the cycle situation improving until after the war. It is no use these people lamenting over their neglect to take the advice so generously given by all cycling interests; they have now to make the best of a bad job and buy what they can in the way of a machine, if, indeed, they are able to find one for sale. Were I in such a predicament I think I should endeavour to buy a second-hand machine of good make and alter it if necessary to suit my style of riding, probably by a change of saddle and handlebars, and possibly by a reduction of the gear; and I recommend the folk who are really in urgent need of a bicycle to make enquiries among their friends. There must be many thousands of machines out of commission, the owners of which are not sufficiently interested to advertise their property; but much can be done to get such cycles into use by persistent enquiry by the person who is in need of the services.

The First Essential

FOR many years I have been trying to persuade people to give cycling the attention the pastime deserves in the way of fitting the bicycle to the rider's comfort. In these times when so many folk are returning to cycling after a long lapse, or are taking to the pastime for the first time, the importance of re-commencing or starting right cannot be exaggerated. So many folk seem contented to ride the machine with the saddle and bar adjustments exactly as fixed when they take delivery of the article. That position may be correct for them, but it would be lucky were it so, even if the dealer selling the machine takes a little trouble in trying to make it fit. Let me give once more the position awheel that I favour. It is this: the saddle peak two to three inches behind a vertical line through the bracket axle of the machine; the reach or height such as to leave the knee comfortably flexed when the heel of the foot is resting on the pedal at its lowest point; the handlebars adjusted at saddle height or an inch lower (whichever feels most comfortable). Such a position may seem strange to those folk who have hitherto sat bolt upright with a long leg-stretch, but I am certain if they will give a trial to the posture I advise they will ride much easier, and be far more comfortably seated. The whole problem of easy cycling is concerned with that one word, comfort, and you can take it as certain that if you have not achieved that condition when riding, your position is at fault, your gear is too high, or your saddle is unsuitable. And all these things can be altered or replaced, and are worth the little attention or expense involved.

The Coming Years

SOME few weeks ago the *Birmingham Daily Post* reprinted a fifty-years-old letter from a then correspondent who likened cyclists to barbarians, and incidentally refused to recognise any obligation on the part of the pedestrian "to budge one inch." And that attitude towards cyclists was common enough when I was a boy. What a change has occurred. If we as cyclists or pedestrians adopted a similar attitude towards motorists to-day, I am afraid the road casualties would treble. Nor would any newspaper editor dare to publish an epistle so denouncing a class of road user who—and I say this without criticism—is mainly responsible for the troubles and trials of highway travel. Certainly we have bowed the knee to motoring, and for good or ill have to abide by the consequences. And it is not all ill, as most of us know well enough if we stop to think for a moment. What I am concerned about in the post-war world of highway travel is that the right of the cyclist to use the roads within the present laws of the land shall not be invaded. We won that right in 1888, when Parliament recognised the bicycle as a vehicle, and we must not lose it if we value our freedom to the one little bit of freehold most of us share, the King's Highway. The ever growing interests of commercial motoring will, I imagine, endeavour to gain some form of road control, using as the excuse the general welfare of the public, and both pedestrian and cyclist will come under their criticism as methods of travel which should be made to give way to the speedier vehicles. I think it quite possible that even the rights of the private motorist might be attacked on the grounds that commerce should take first place. It would be strange to see the combination of private motorist, pedestrian and cyclist joining forces to keep commercial interests at bay, but such a condition is not by any manner of means improbable, judging by my experience of the complete disregard, by the commercial users, of any other road interests but their own. That fifty-years-old letter is just an average example of what we cyclists faced in the early days of the pastime; and that we won through to our present position we owe to the fine work of the cycling organisations and its specialised press. We must not forego that position or surrender one jot of our hard-won freedom.

The Life of a Bicycle

I SEE the question has been raised again as to the average life of a bicycle. Some years ago I gave my opinion as five years, and I see no reason to alter it. True enough I had a host of letters telling me that the writers had been riding the same bicycle for anything up to thirty years; and I did not then, and do not now, doubt their word. But they had missed the qualifying adjective average, and were merely stressing the exceptions. Furthermore, they failed to say how far they had ridden their thirty-year-old mounts, and the care and attention they had given them. My average figure was based on the daily usage of the ordinary bicycle in utility service, a bicycle which is not normally wrapped in cotton wool, and all too often does not receive its proper modicum of lubricant, or the adjustment attention desirable to ward off wear and depreciation. Certainly a machine can be made to carry its service for a much longer period than five years providing care, attention and necessary replacements are forthcoming: but my observations suggest that the average bicycle, i.e., the majority, are more neglected by their owners than any other piece of property costing a similar figure. I do not pretend to coddle my machines, but I do oil and adjust them regularly, and occasionally have them cleaned and touched up, with the result that my property gives me longer service without appreciable depreciation than the average. After all, if a bicycle carries you through five years of riding at 8,000 miles a year, costs you £10, and a further £10 for repair, replacements, oil, lamps, macks, outfits, etc., it amounts to 10s. per 1,000 miles, all in, or, less than an eighth of a penny a mile. Not so bad in these times of travel cost, for it must be approaching if not cheaper than boot leather.

The Great Compensation

THOSE folk who are in a position to make evening journeys during these lovely summer nights are lucky. It is like having a holiday in the middle of the week, indeed that is exactly what it is, those few peaceful hours by the wayside when you can rest and smoke and note all the interesting things that make up the sum of country life. I usually treat myself to one such evening a week, leaving the garden to care for itself, and forget that on the morrow I shall be fire-watching among the factory smoke stacks. These stolen evenings cost nothing, indeed they sometimes pay a rich dividend, for I've not been prowling along the road for over fifty years without making friends, calling to pass the time, and often being invited to test their produce. But I do not go out on predatory excursions, they are merely incidental to the joy of a break in the dull round of the week, a break that makes me realise again and again how much I owe to the bicycle and its silent service, and to an upbringing that made me conscious of the compensations that lie in a love of country life and country scenes.

CLUB NOTES

Taylor Rides Again

JACK TAYLOR, West of Scotland Clarion and former Scots champion, rode for the first time for two years in the Lancia 50, and won the event with 2 hrs. 13 mins. 1 sec.

New Lanarkshire Star

ALEX. GILCHRIST, Royal Albert C.C., is the year's best Lanarkshire cyclist. In his own club's open 25, out of an entry of 82, he beat Jack Taylor, the ex-Scots champion, with a time of 1 hr. 6 mins. 18 secs., compared with Taylor's 1 hr. 6 mins. 32 secs.

Clarion Membership Maintained

THE membership of the National Clarion C.C. is keeping up very well, and in some districts is actually increasing. Most active area of the club is still Manchester, followed by London, West of Scotland and Yorkshire.

Shackleton Marries

JACK SHACKLETON, former Queensbury Road Club (West Riding) star, was recently married at Denholme to Miss Margaret Bradshaw. He is at present serving in Scotland with a radiolocation unit, and is in touch with local cycling circles.

First Scots Cancellation

THE Ayrshire and Dumfriesshire C.A. open 50, which should have been held late in June, was the first Scottish time trial of 1942 to be cancelled. The sport is holding its own well in Scotland, where there are many young miners and engineers interested in competitive cycling.

My Point of View

BY "WAYFARER"

Reliable Unreliability

AS a great writer once said (I rather think it must have been myself!), the only reliable thing about our climate is its utter unreliability. A recent case in point leaps to the mind—a day of such perfection (and such heat) that you could have wagered any sum up to threepence that it would be safe to leave your cycling cape at home. In fact, I nearly did so. But, pinning my faith to what one of the poets nearly said: "Trust no weather, howe'er pleasant," I took my equipment as usual—very much as usual—and had reason to be thankful for the possession of so much common sense. For, having baked me gloriously for several hours, the temperature fell off its pedestal soon after tea, and the last stage of my journey was done in a series of thunderstorms. A week or two later, when it was possible for the daily newspapers to talk about that particular stretch of weather without completely wrecking the war effort, it was stated that there was a difference of 25 degrees between Saturday night temperature and that of Sunday morning.

Undressed for Cycling

IT was on this particular day that I almost undressed to go cycling. In normal times I wear little enough, but I felt that the hour had come for reducing that little, if comfortable travel was to be achieved. Tightening, slightly, the waist of my shorts so that braces could be dispensed with—I overcame, for the moment, my hatred of any constriction of the round-about, combined with my ahhorrence of belts—I left my ice-cream jacket at home and went forth wearing an absolute minimum of clothing: shoes, stockings, shorts, and shirt. At no time, despite the great heat, was I in the least little bit uncomfortable, and I fairly revelled in the conditions under which my journey was made. In the matter of clothing, the last few years have witnessed, so far as I am concerned, a considerable development, and I find now that I can stand hot weather much better than was once the case. I believe this is due to a saner method of clothing myself. For years and years I cycled in a collar, in a tweed jacket with waistcoat, and in knickers or plus-fours, and I often found myself extremely uncomfortable on hot days. It was tiring, too. I now wear as little as possible, and I rejoice in the heat, no day being too torrid for cycling. Incidentally, I dispensed with head covering almost 50 years ago, and it is a very long time since I wore smoked glasses, my view on the latter point leading me to say that, in a country where we see so little of the sun, we cannot afford to dull its shining when it is on duty.

Cyclists Wrongly Clad

THE foregoing paragraph prompts me to go on to add that it has been very discouraging to see, on recent warm days, so many cyclists who were not "dressed for the part." One realises, of course, that there may be certain difficulties in connection with coupons and things, but let me say, just as dogmatically as I can, that boots and long trousers are as suitable for cycling as trousers would be for swimming and boots would be for dancing. I suggest that the sooner people who ride bicycles get this point into their heads and then turn from the error of their ways—for error it surely is—the quicker they will be in obtaining their share of cycling enjoyment. (I am not without experience in cycling in trousers, and even to-day, in the process of getting to and from my work, I account for 60 miles per week. My day-by-day experience merely serves to emphasise what I already know, namely, that long-trousers are almost the last word from the cycling point of view! Nor can any accusation of inconsistency lie against me. I submit, for once in a way, to the conventions!) Stiff collars are equally unsuitable for the greatest of road games, but the freedom of the knees (and the ankles) is far more important than that of the neck. Just as I have long preached about the importance of "as little bicycle as possible," so I now espouse the cause of a dearth of clothing, and I suggest that what one wears, from head to foot, should be suitable for the cycling purpose. Thus, let me say once again that there is nothing to beat shorts, and that a pair of shorts can easily be fashioned out of a pair of trousers; that shoes should be light; that an open-neck shirt is a joy; and that a jacket, light in colour as in weight (when it is necessary to wear such), makes for the enjoyment of our glorious pastime.

A Convert

AT this time of the year part of my usual cycling plan is to go out immediately after breakfast on a Sunday, have lunch in the country, and get back home in time for tea, and for certain duties which await me in the evening. In the ordinary course of events, as I pedal through the Forest of Arden, making my way by a 30-mile route to a village only 16 miles from home, I meet an Ancient Gossip returning from his constitutional awheel, and we stop and have a "crack." My friend—a great clubman, and past-president of one of the big road clubs in the Midlands—is a bag-man by way of business, and, of necessity, has had to sit much in motor cars. He remains faithful to the bicycle, however, and now, on the approach to his seventieth birthday, he seems keener than ever. (He looks upon me as the greatest living exponent of cycle-touring, which may or may not be true.) He speaks to me with enthusiasm of "Dr. Bicycle," and, in comparing his waistline with mine, deplores the fact that for a period he was not so active a cyclist as he might have been. Up to the other day, I never encountered him awheel without making a point of having a word to say on the subject of shorts. The probability is that I convinced him that something was lacking from his cycling life because he clung to plus-fours. At any rate, I said to him, as I have said to others—and as I now say to you, good reader—that cyclists who have never ridden in shorts do not know what cycling is. (A violently extreme statement to which I cling like a limpet! I believe it to be true.) Well, constant dripping has worn away the stone in the case of my Ancient Gossip. One Sunday recently I found that his defences were down; his better-half was abbreviating a pair of his long trousers. A week later I rejoiced to note, when I met him near the usual place of encounter, that he was showing his knees. I fancy he felt satisfied that he "was on a good thing," and I am certain that wider experience will confirm first impressions.

Jeu d'Esprit

IT may be suggested that cyclists are divided into two classes—those who observe "Halt" signs, and those who don't!

Mind-Broadening Travel

IN the conclusion of an interesting contribution which recently appeared in a daily newspaper, it was suggested that, until the war is over, and perhaps for some time afterwards, foreign travel to improve the mind will be impossible. There cannot be much doubt about that, because there is every appearance that the average man is going to be very poor, and that taxation will remain at an unpleasantly high level. Without decrying foreign travel, however, may it be submitted that the mind-widening process can at least be commenced in the Homeland. Probably it is true that we British people cannot get rid of our inherent insularity without foreign travel, but here in these delectable islands of ours there are ample opportunities for us to expand our minds—for which, undoubtedly, there is great need.

At the end of the war—and even before, and preferably now, as opportunities permit—let us visit the remote and less "civilised" portions of England and Wales; let us get off the beaten track and invade "the wilds." Let us depart from our placid ways and our ordered life and see how the other half of the world lives. Later on, when conditions ease somewhat, let us go farther afield and familiarise ourselves with Scotland and Ireland.

Take the Winding Road

THE "authorities" in London appear to be able to envisage (for example) only wide, straight, and well-made main roads, which are eternally crowded with traffic. So think the "authorities"—and they are wrong! Let us—and the quidnuncs—go and see for ourselves some of the narrow roads of Scotland—the one-vehicle-width roads along which at regular (or, more likely, irregular!) intervals, short loops (or cut-outs) are provided so that the traffic, such as it is, can pass. Let us talk with the "but and ben" dwellers and see how life deals with them. The extent to which the old method prevails of paying for goods in kind, rather than in cash, may be a revelation to some of us. Let us observe the bedstead-ends which act as railings to enclose their small gardens, and the inverted bottomless buckets serving as chimney-pots. Let us note as we pass through the villages on a Sunday that the front doors of the cottages, standing hospitably open during the week, are uncompromisingly closed, while perhaps the window-blinds are drawn. The crofter's friendly attitude of Saturday and Monday (as of all week-days) is eclipsed on Sunday, and he views with stern disapproval the traveller's not unnatural desire for that midday meal he so gladly provides on a week-day.

Notes of a Highwayman

By LEONARD ELLIS

The Lure of the Landmark

TO me there is always a fascinating appeal in the distant landmark. It is interesting to watch it getting nearer and to see its details becoming clearer. To see it sometimes on the left, sometimes on the right. Sometimes it is completely lost to view on account of the winding of the road and intervening trees, and we speculate on the position of its reappearance. Then comes curiosity and a glance at the map. We may find it—we may recognise it. Nearly every landmark has a purpose and a history, and when we find one with neither it becomes even more intriguing. It is part of the equipment of every intelligent tourist to learn these stories—they are all interesting, they are all part and parcel of that mysterious something that converts cyclists into cycle-tourists.

Legends of Somerset

LANDMARKS are nearly always sited on an eminence so that they are visible for many miles. Cyclists approaching Somerset from most directions will see the tower on Glastonbury Tor long before they reach it, as it stands 500ft. above sea level, in flat country. We search for the story and find that the tower is intimately connected with the legend of Joseph of Arimathea, who is said to have "landed" on Wirrall Hill. The curious use of the term together with the name of the locality—"Isle of Avalon"—gives rise to further wondering. Here Joseph planted his staff, which grew into a miraculous tree. This was hacked down by a Puritan soldier, who is said to have cut off his leg in the attempt as a punishment for his profanity. The original tower of St. Michael was destroyed by a landslide in 1271 and the later tower still stands, beckoning cyclists from all quarters. The miraculous thorn tree now in the grounds of Glastonbury Abbey, is an offshoot of the original.

There are hundreds of such landmarks dotted about the country and their stories are all worth discovering. The church at Bredon-on-the-Hill is visible for many miles, and the story related tells of a gigantic battle between the powers of good and evil. As fast as the pious church builders erected the stones the Devil carted them away, until naturally good prevailed

This old mill is a famous Oxford landmark.

F.H. WILSON

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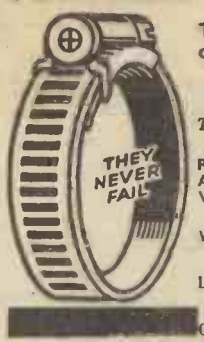

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