VOL. XXVIII. No. 7. JULY 1943

MECCANO MAGAZINE

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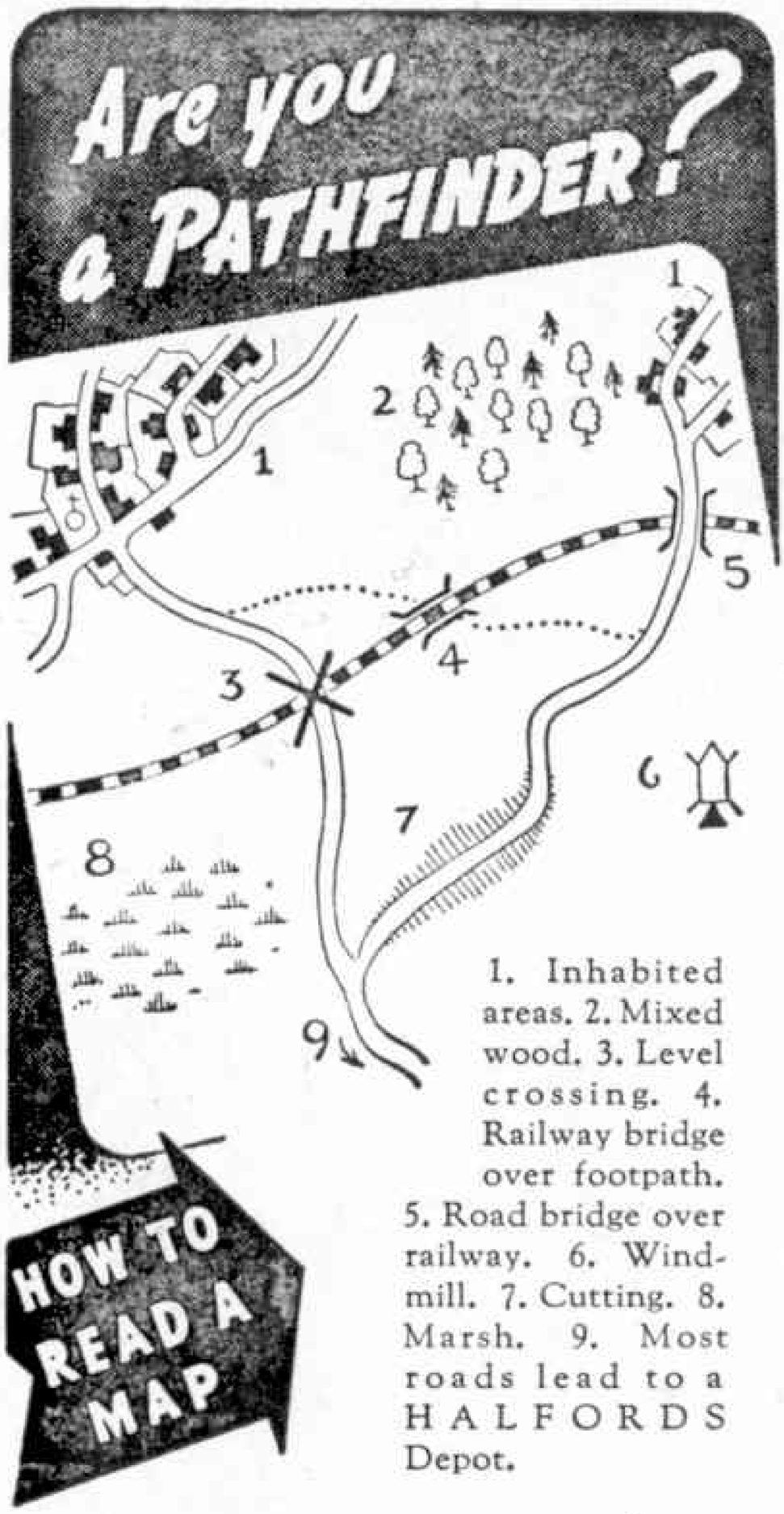

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Editorial Office:
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Vol. XXVIII
No. 7
July 1943

With the Editor

British Railways in Wartime

Since the outbreak of war, British railways have carried out with amazing efficiency what can safely be regarded as the biggest transport job in history. So smoothly has this task been done, however, even during the worst periods of bombing, that few of us have any idea of what it has involved. For this reason I welcome the recent issue of "*Facts about British Railways in Wartime*" (see page 232). This splendidly illustrated booklet should be in the hands of every reader.

It shows how British railways are steadily growing in efficiency, in contrast with the German railways, which are now in real trouble from the attentions of the R.A.F.

Overseas Competition Entries

Many overseas readers have written to tell me that they now receive their "*M.M.*" too late for them to enter for the various competitions. I have therefore decided to extend the time limit for these readers by a further two months, making seven months from the date of issue. I hope that overseas readers who had given up sending in entries will now start again.

Leaders in the War

General G. C. Marshall

General George C. Marshall was born in 1880 at Uniontown, U.S.A. He was trained for a military career, and after passing through the Virginia Military Institute he was commissioned a second lieutenant of infantry in the U.S. Army in 1901. After a period in the Philippines he returned to the United States to go through further training, graduating from the Army Staff College in 1908, after which he was appointed an Instructor at the College. From 1913 he served a further three years in the Philippines.

General George Catlett Marshall, D.S.M., Chief of Staff of the United States Army.

When the United States entered the 1914–18 war Marshall went to France with the American Expeditionary Force, serving first as an operations officer with the First Division, then as Chief of Operations, First Army, and finally as Chief of Staff, 8th Army Corps. From 1919 to 1924 he was A.D.C. to General Pershing, after which he had three years' service in China, followed by important posts at U.S. military staff colleges.

In the present war General Marshall is Chief of Staff of the U.S. Army.

The Air Transport Auxiliary

By C. G. Grey

Founder of "The Aeroplane" 1911, Editor until September, 1939

ONE of the most amazing organisations in this astonishing country of ours is the Air Transport Auxiliary. We have always made a habit of losing every battle except the last, and of snatching victory out of defeat and of doing impossible things with unusable material. And A.T.A., as it is always called, is a prize example of all those things, for the people who are in it ought to have given up all hope of war-flying, by all the rules of the game.

They are an organisation of pilots, mostly men but a lot of women too, whose jobs are to fly aircraft from the factories where they are made, after they have been passed out by the firms' test pilots, to R.A.F. operational stations, or to R.A.F. stores depots; and sometimes they fly machines back from R.A.F. stations to the factories for overhaul. In fact they may be called upon to fly any machines anywhere except on active service overseas. Besides their pilots they have their own flying school and repair-shops and maintenance engineers and mechanics, and a large and highly efficient operational staff.

They have enough pilots to man an Air Force of respectable size. In fact I should say that they have more pilots than any nation had before the war except the R.A.F., the Luftwaffe, the Russians, the French, the Italians and the Japanese. They certainly have more than Australia or Canada or any South American or any of the smaller European countries had. And not one of those pilots is fit for war-flying. They are a surprising collection of "the maimed, the halt and the blind," as the Biblical phrase has it. But a great many of them fly better than do any except the very best R.A.F. pilots.

Sometimes one comes across one of them who looks young and athletic, but one always finds that he has some disability which put him out of the R.A.F. Certainly the R.A.F. doctors are very finicky, or choicey, about the physical qualifications of a pilot, and, in spite of the experiences of the last war, will not admit that a good brain in a defective body is a better enemy-killer than a Grade A body without any brains. The doctors are particularly stupid about the sort of short sight which can be corrected by glasses, and about slight colour-blindness. But what the R.A.F. loses in that way, the A.T.A. gains, and a man may be more useful ferrying aircraft than fighting them.

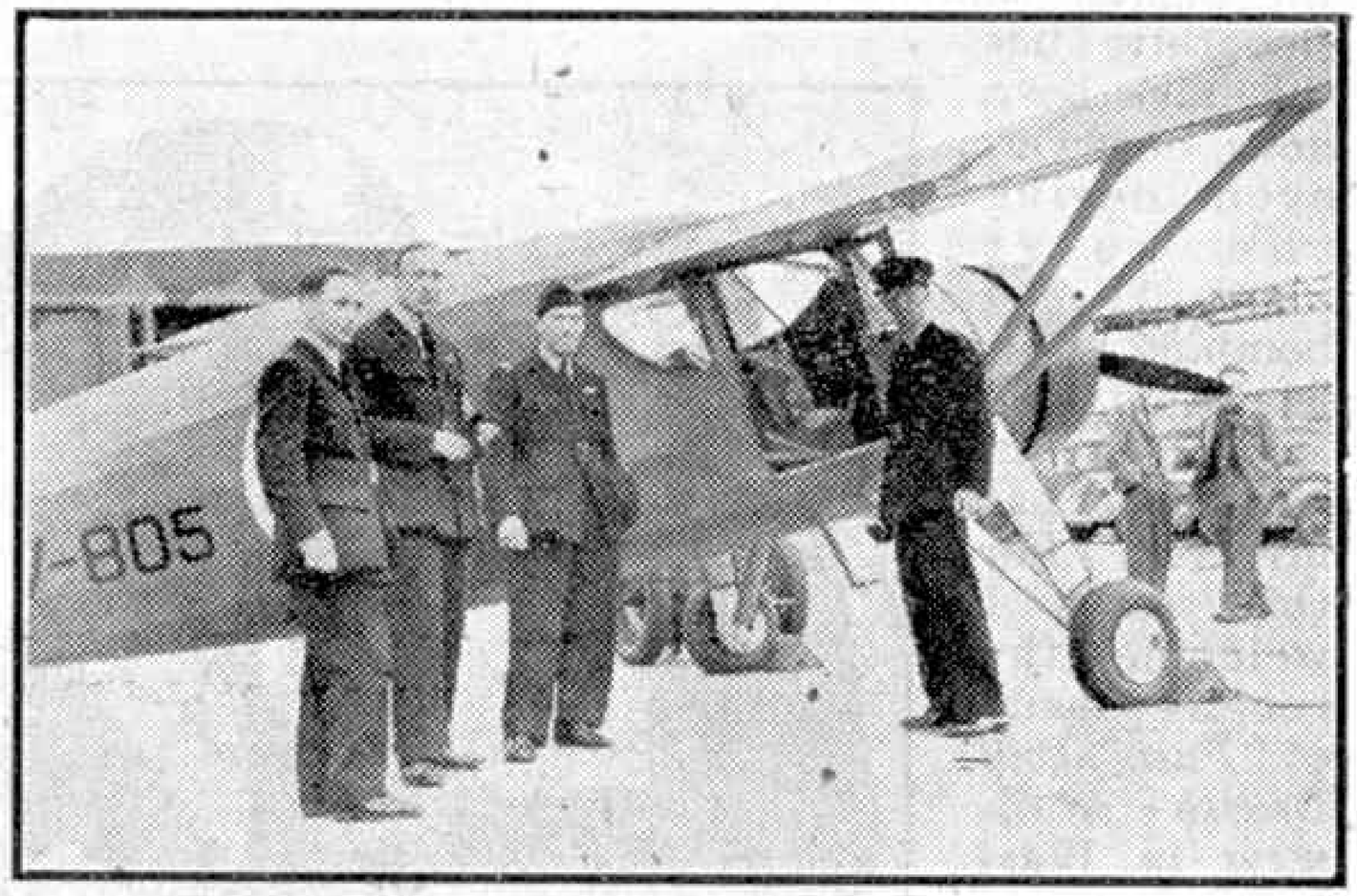
But most of the A.T.A. pilots really are below any reasonable specification for war-flying. Many of them are too old. They are pilots of the last war who have flown for fun between wars, or middle-aged men who took to flying for sport and kept their own aeroplanes for touring. More are physically defective One or two have only one arm, the other is off right at the shoulder, yet they fly "Hurricanes" and "Spitfires" and "Mustangs" as well as any two-armed pilot.

One pilot lost an eye and a hand in the last war, and was rather badly mangled besides, but he flies twin-engined machines, "Blenheims," "Bostons" and, I believe, "Mosquitoes." How he handles the mass of levers and switches, and things to push and pull and twist, with one hand while he steadies the control-column or wheel with the wrist-stump of his left hand, is extraordinary. He was lucky in losing his left hand, or in the fact that the pilot sits on the left, for if things had been the other way he could not have reached across himself to get at the more distant controls.

One-legged pilots, or pilots who have defective legs, are not uncommon. But, however defective their bodies may be, they all have first-class heads. And that is why they crash so few machines.

Naturally the men pilots are known as the Ata-boys and the women as the Ata-girls, among those who try to be funny about them. That is not an official designation, but the pilots do not resent it, for it is in a way a compliment.

So far as I know, all the women pilots are physically sound. I do not think that any of them have to wear glasses, and they all have their full equipment of hands and feet. But some of them are mothers of nearly grown-up families and several have children of boarding-school age. And to see a little delicate-looking woman climb into the pilot's seat of a four-engined bomber and hustle off is a bit shaking to anyone who has been brought up to the old-fashioned idea that women's place is in the home.



The ATA boys.—Pilots of the A.T.A. and one of their American monoplanes used as taxis to take them to aerodromes where they pick up the machines they are to deliver. Photograph "The Aeroplane" Copyright.

All the women were pilots before they joined, and many of them had their own or their husband's private machines and used to tour the Continent, so they are very competent navigators. And those who have qualified handle the small fast machines as well as the bigger and slower ones—in these days there is not much difference between the speeds of the big and the little machines.

The A.T.A. was, in fact, organised before the outbreak of war by a bunch of civil pilots, mostly private owners of aeroplanes, who knew that they were unfit for war-flying by R.A.F. doctors' standards. They also knew that they could fly as well as any R.A.F. pilot, so they suggested that by doing ferry work, which had to be done, they would release so many R.A.F. pilots for active service.

The head of the group who tackled the Air Ministry about it was Mr. Gerard d'Erlanger, of the well-known

international banking firm. And among the first members was Mr. Philip Wills, who is famous, wherever soaring and gliding is done, as the breaker of many British soaring records. He also had an aeroplane of his own. Another pioneer was F. T. Bradbrooke, who for years had been my assistant in charge of Civil Aviation on "*The Aeroplane.*" He, unfortunately, left A.T.A. to join the trans-Atlantic Ferry Command and was killed by running into a hill off the coast of Scotland, with 13 others, in a "Liberator."

The early days of A.T.A. must have been a nightmare for Mr. d'Erlanger. Unsuitable people got in and had to be got out. And discipline is difficult in a civilian volunteer show such as this, where no punishments can be inflicted except dismissal. But

The ATA girls.—With one of the Avro "Anson" taxi aircraft, known as "Faithful Annie," ready to take women A.T.A. pilots to another aerodrome to pick up aeroplanes to be ferried across country. Photograph "The Aeroplane" Copyright.

most of those who joined were keen and loyal, so the work developed well.

One snag was found in a bunch of pilots who were recruited in the United States by people who did not know what was wanted. Some of them were grand and are still with A.T.A. Others were ex-airline pilots, used to flying on radio beams, who could not navigate by compass. Others had never flown except in "Cubs" and such things round aerodromes. And all of them had been promised much higher pay than the British pilots. But that trouble, too, was flattened out with tact and firmness.

Later on, pilots came in from the R.A.F. who had been invalided out, or too badly shot-up or crashed for more war-flying. And most of them have been welcome additions to A.T.A.

As you may have gathered, ability to fly and find one's way across country is a more important qualification than medical fitness. Naturally a medical exam. is needed, to make sure that a pilot will not die suddenly in the air. But the flying exam. is more important.

That is where the flying-school comes in. Not only are pilots tested to see how and what they can fly, but they have to be taught how to fly aircraft which they have not flown before. Some pilots seem to be able to fly anything, but even they have to be taught what all the levers and taps and switches are in aid of before they can be let loose in the air with perhaps £50,000 worth of King George's aircraft. But, remember, the school is for people who can already fly. They do not take on teaching flying from the ground up—*ab initio*, as it is called—so do not imagine that you can go and volunteer for A.T.A. if unfit for the R.A.F.

When the pilot has been passed out by the school for certain types of machines, he or she is given some easy ferrying for a start—say from London area to a station in the East, or North-East, where there are no mountains and plenty of landmarks. And as their experience grows the pilots go on more difficult jobs, anywhere between Land's End and John o' Groats, and are sent out in worse and worse weather Certainly the weather through which some of those pilots go in fast machines, which could not do a safe forced landing except with extra luck of the ground, is astonishing.

The simplest ferrying is, obviously, taking training machines, "Magisters" and "Moths," from the factories to the R.A.F. flying schools. A party of the lowest grade pilots, perhaps six or eight, set off from Headquarters in an Avro "Anson," which is the regular omnibus, arrive at the makers' aerodrome and fly the machines away, while the 'bus pilot flies back to H.Q. Or perhaps the 'bus may have to fly to another R.A.F. station to fetch back some pilots who had got there earlier, or had stopped there the night before. Or the 'bus may follow the trainers to the station to which they were going, if several were for the same place, to fetch the pilots back.

Or if a big bomber is to be moved, a pilot and a flight engineer of A.T.A. will be flown to the makers' aerodrome in a single-engined machine, generally an American with about 250 h.p., as our "Puss Moths" are a bit slow for the work. Or several pilots may be flown in an "Anson" and set down one or two at a time at different aerodromes to fetch machines.

The pilots do not all work from one H.Q. The A.T.A. has "pools" of pilots in various parts of the country, Scotland, North England, West, East, Midlands, South, North Ireland and Wales. So that there are always ferrymen, or women, within an hour's flying or so of any of the big aircraft assembly plants. Each Pool Commander has to know the whereabouts of each of his pilots every evening, and has to report to H.Q. where they all are. H.Q. knows from the factories and from R.A.F. stations what machines have to be moved next day and where they have to go. And so orders are sent at night to each Pool which pilot is to fetch what machine and where it is to go.

Also, if a pilot arrives late, especially in the winter, he often has to spend the night at the R.A.F. station if there be no hotel near by. And orders are sent to him for the next day's work. He may have to take a machine from that station to a factory for overhaul or repair, or to another station. Or a taxi-plane may fetch him from there to his Pool, or he may be picked up by an "Anson" bus which is going that way and set down at another station, or brought to the Pool, ready to take on another job.

The charts which are made up every night at H.Q. showing where each pilot is and what he is to do next day are bewildering to anybody who has not grown up with them. And, naturally, every pilot has to telephone as soon as he can after landing, so that H.Q. can know where to send him next. Which may account sometimes for the delay in getting telephone trunk calls through in the evening, for there must be hundreds of those calls going about.

A pilot may start from H.Q. in the South in the morning by "Anson" for a factory 20 miles away. Thence he may ferry a fighter to a Northern aerodrome. From there he may be fetched by a taxi-plane to ferry a four-engine bomber to an Eastern aerodrome and there he may stay the night, to ferry another bomber to a Midland factory, or go back, perhaps by train, to H.Q. that evening.

Besides working out the (*Continued on page 250*)

Making the Most of Locomotive Power

By O. S. Nock, B.Sc., A.M.I.Mech.E.

IN the ceaseless procession of traffic that flows along most of our main lines there will occasionally be seen a strange sight—a huge modern locomotive working a slow train of, maybe, no more than five or six coaches. The casual observer will probably put this phenomenon down to certain exceptional circumstances, such as an engine fresh from the shops being "run in" on a light duty. But if the same observer happens to see this particular train on another day he will doubtless be surprised to see that it is again hauled by a very large engine; it will not take much more investigation to discover that the working is a regular one. The first question that comes to mind on making such a discovery is "why so absurd a waste of locomotive power?"

Again, one may witness two succeeding expresses running say twenty minutes to half an hour apart, and each making a non-stop run over the same 150 miles of line; the first, with 15 coaches, may have a 4–6–0, and the second, with only 12, a "Pacific." It certainly strikes one that it would have been much more logical to exchange the engines at the starting point of the run.

These and many other apparent anomalies in the allocation of locomotive power provide a most interesting study, not least in the very vivid contrast modern practice affords with the methods existing up to the outbreak of the last war.

How different some of the old workings were is not perhaps realised by present-day readers. We have heard about the times when each driver had his own engine, but in some instances this practice went a great deal further. On the former London, Brighton and South Coast Railway the up Continental Boat Express from Newhaven to London Bridge was for many years a tidal service; there was no fixed hour of departure, as the Channel crossing was dependent upon the tides. To ensure that there was always a locomotive manned and ready for this job, the railway company made a contract with one driver to work this train every day.

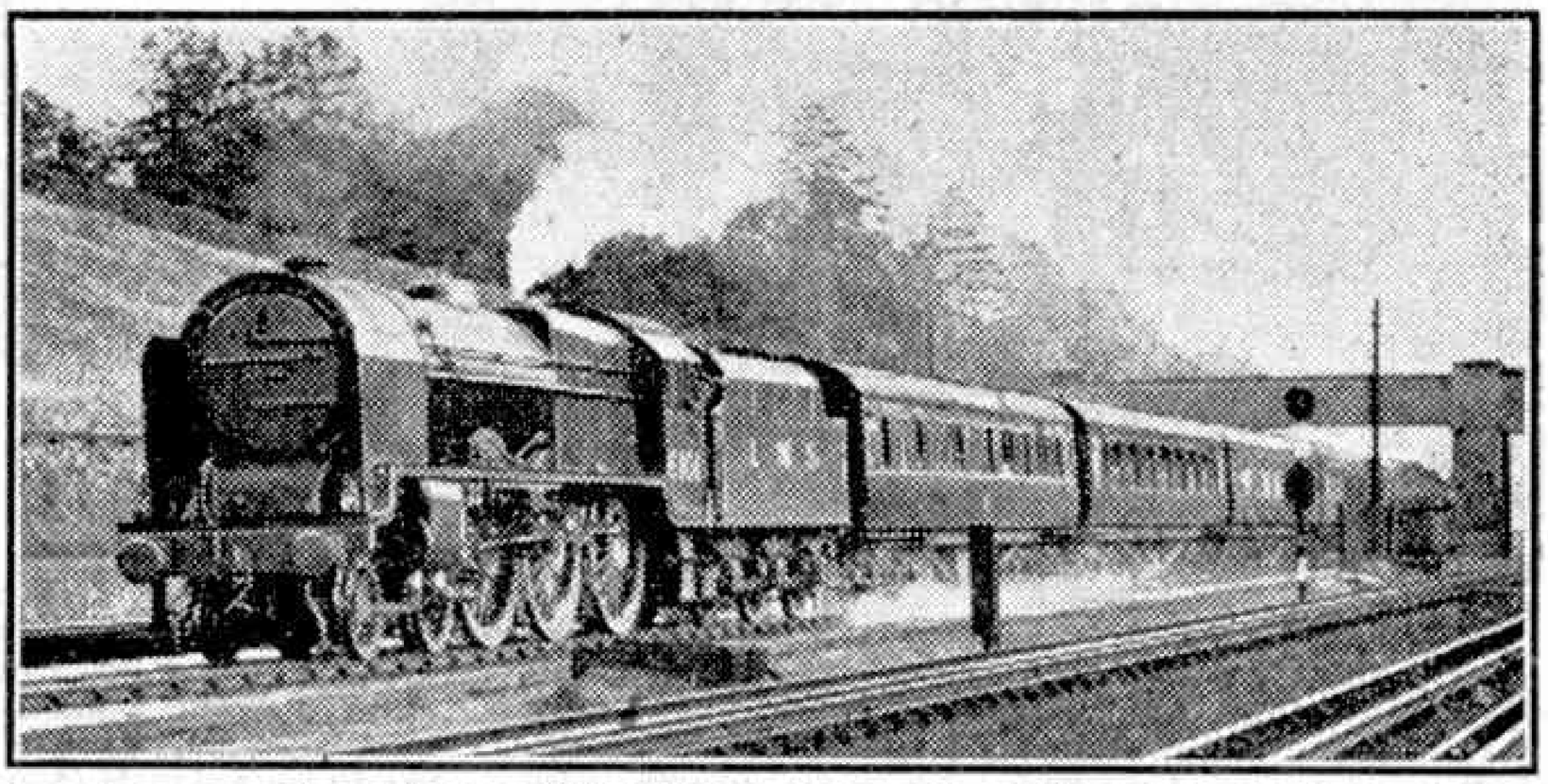
The company paid the driver a certain fixed wage, and provided him with an engine, coal and supplies; he had to engage his own fireman and pay the cleaners. His contract was to do the job; at what hour of the morning did not matter. A London engine was allocated to the duty, and worked down to Newhaven overnight on the corresponding outward Boat Express. This was the only turn worked by the particular engine—a journey of 1½ hours each evening, arriving at Newhaven 10.30 p.m.; then a wait until six next morning, or whenever the boat happened to arrive, and so back to London Bridge. About 3¼ hours were thus spent on the road, and the mileage run was 113½ every 24 hours.

Of course this was an extreme case, but on other lines too the men remained with their own engine, whether that engine was on first class or secondary jobs. Moreover, it might happen that a top link express driver had an engine that developed trouble of one sort or another. While his engine was laid up he would be allocated another, but as soon as the "casualty" was fit for the road again her regular crew would at once take charge and nurse her through all the process of running-in, even though it meant they were out of express traffic for a week or more. This practice was followed in the early days of the Great Northern "Atlantics," though the engines and men worked in links rather than being confined to one particular duty.

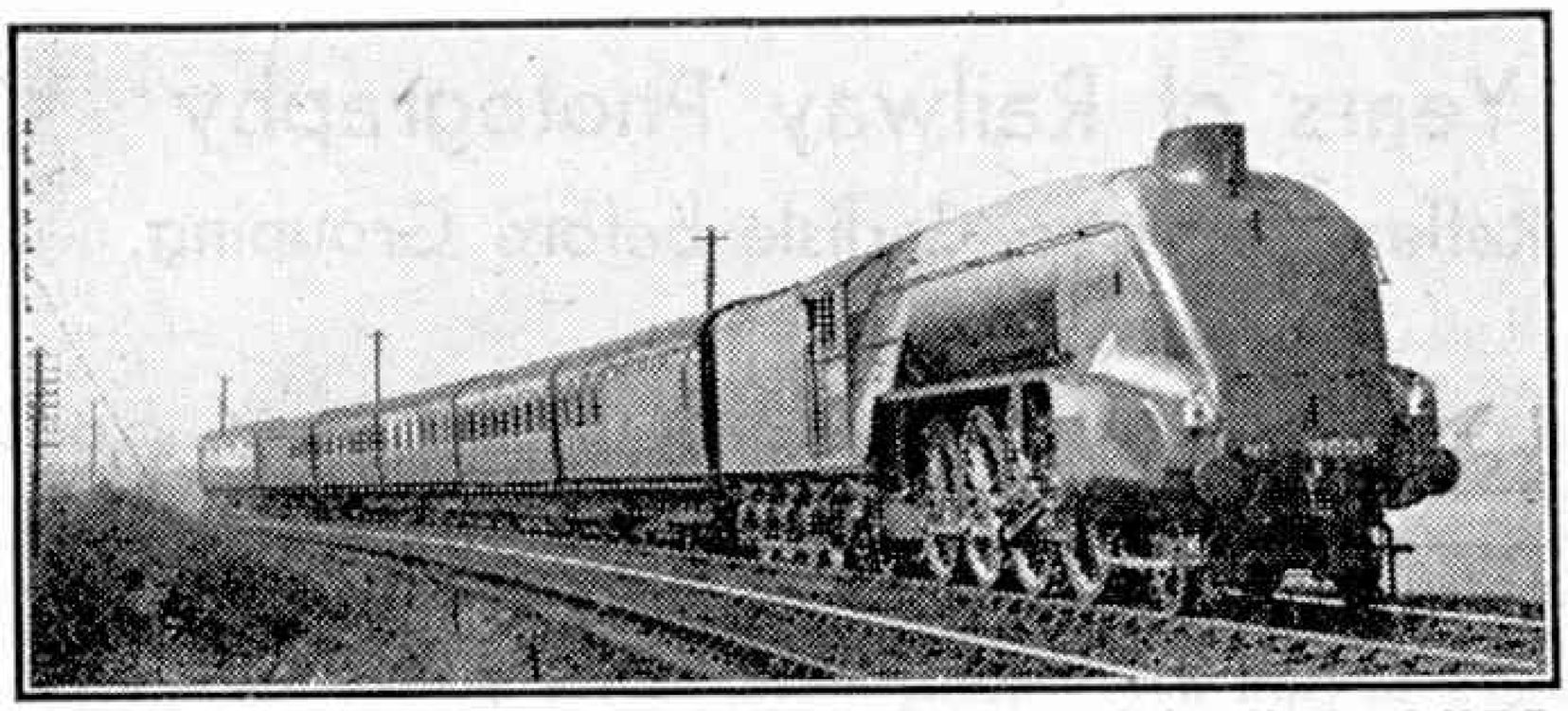
One of the most remarkable "one-engine" trains was the afternoon West Coast dining car express from Glasgow to London, on the former Caledonian Railway. For some 10 years this train was worked almost exclusively by the 4–6–0 locomotive *"Cardean,"* and Driver David Gibson of Polmadie shed. Leaving Glasgow at 2 p.m., they were due at Carlisle shortly after 4 p.m.; after which there was a 4-hour wait for the corresponding down express, which arrived back in Glasgow at 10.20 p.m. This involved a round trip of 205 miles.

But even before the long innings of *"Cardean"* had begun, and while the Brighton's Continental service via Newhaven was still tidal, the London and North Western Railway had introduced the double-manning of express passenger locomotives. In order to get more work per day out of each engine, it was shared by two crews, and the turns were so arranged that the engine usually returned to its home station after one round of duty, whereupon one set of men relieved the other. The old pride of the men in their engines was fully sustained under this arrangement, for each pair vied with the other as to which could do the best work and present the smartest turnout. One heard of drivers giving the cleaners an extra shilling to shine the buffers, while other men went to the extent of fitting ornamental mountings to the smoke-box door-handles.

An interesting modern example of straight double-manning was in force on the Edinburgh-Aberdeen route of the L.N.E.R. when the 2–8–2 express engines were first put to work. The early turn worked the down "Aberdonian" express from Dundee to Aberdeen (5.40 a.m. ex Dundee), a run of about 1¾ hours, after which the engine and men returned to Dundee on the 9.50 a.m. up express, having a similar timing. Then the engine had a wait of about 3½ hours before going out on the late turn, on the 3.35 p.m. express to Aberdeen; the return trip was on the up "Aberdonian," which was due into Dundee at about 9.20 p.m. The engines on this duty spent about 7 hours on the



An engine on the job for which it was purposely designed—an L.M.S. "Royal Scots Grey" on the Merseyside Express, a very heavy and fast passenger train. Photograph by E. R. Wethersett.



An engine on duty for which it was definitely not designed! An L.N.E.R. streamlined 2-8-2, "Thane of Fife," on a 6-coach semi-fast train. Photograph by E. R. Wethersett.

road daily, and covered about 285 miles.

One of the principal aims of the modern locomotive designer is to make engines capable of standing up to greatly increased mileages, so that the entire traffic of a railway can be operated with less engines than previously. In this article I am not concerned with the technical details now incorporated that have so increased the availability of modern locomotives, but rather the way in which the various turns of duty are arranged.

There was a time when the locomotives of crack expresses were nursed and groomed for their particular duties, and no other jobs were done in between times. Nowadays, even with the least intensive use of locomotive power, such reservation cannot be thought of. On the Great Western Railway, engines of the various West of England expresses work through from London to Plymouth, and on those taking the Bristol route, such as the 5.30 a.m. down, it involves a fairly long continuous duty, with about 6¼ hours on the road. But in nearly every case engines so employed are remanned at Plymouth, and make a return trip to Newton Abbot, or Exeter, before finishing the day's work. In such cases one may then see a "King" or a "Castle" hauling a lightly-loaded train stopping at all stations between Plymouth and Exeter.

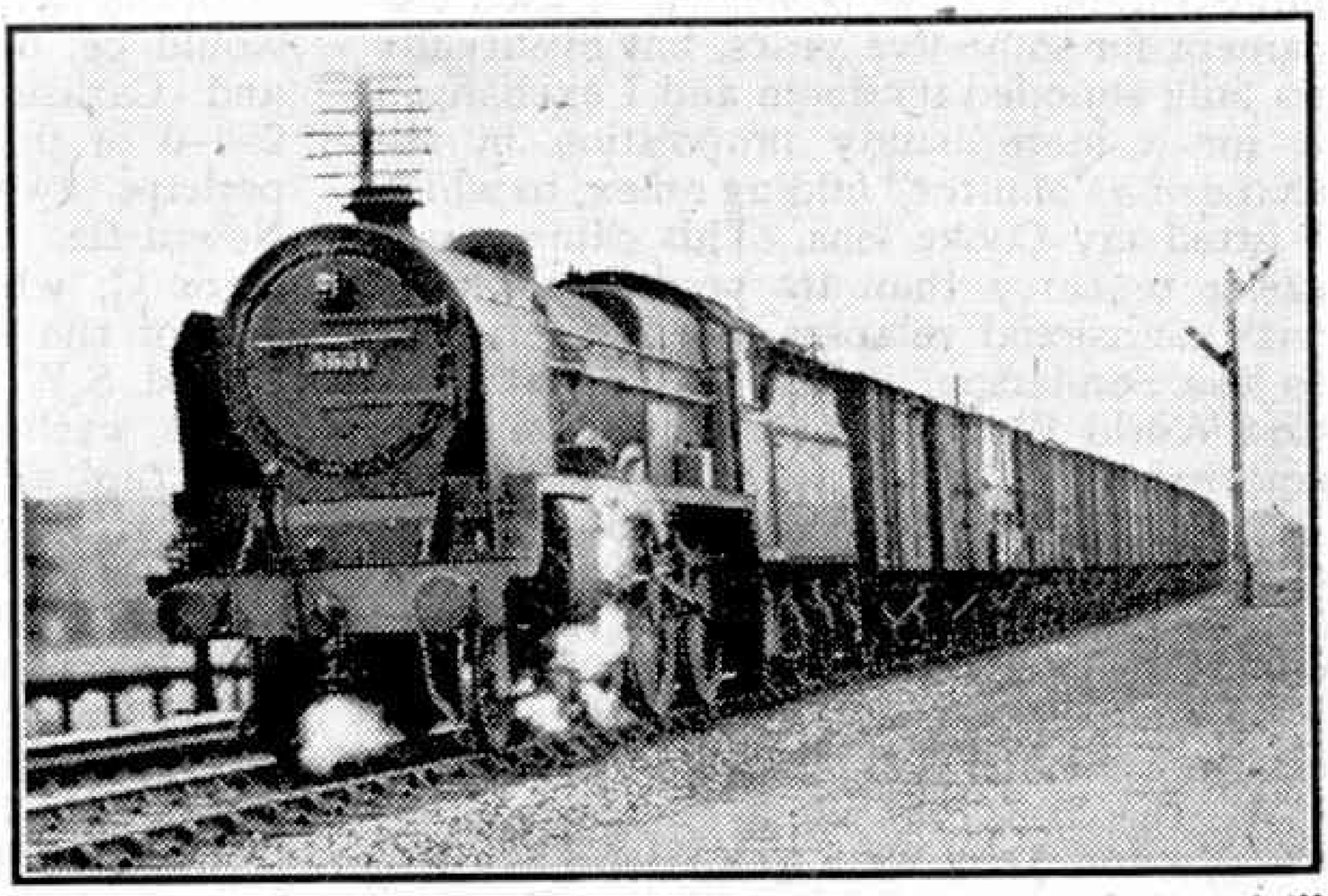
Of course the kind of locomotive rosters that can be arranged depend very much on the length of the routes and the nature of the traffic. A duty like that from Dundee to Aberdeen fits in very well, and gives plenty of time for cleaning and attention between the successive turns. But nowadays the tendency is all towards longer through runs. When the 2–8–2s were first introduced in Scotland there was talk of through running between Aberdeen and Carlisle, the engine working up the Waverley route on one of the Midland Scotch expresses, and then continuing on the East Coast train that conveyed the through Aberdeen coaches. Such workings do not appear to have been found practicable, however, though just before the war some positively Marathon turns were introduced between London and Edinburgh.

On the L.M.S.R., when the "Pacifics" were first put on the "Royal Scot" expresses, the two locomotives 6200 "*The Princess Royal*" and 6201 "*Princess Elizabeth*" worked north one day, and south the next. Each engine was on the road for about 7¾ hours, and the turn round time at Glasgow and London was 16 hours. But when more "Pacifics" were available, a more intensive use was instituted. The London engine taking the down "*Night Scot*" (11.45 p.m. ex Euston) arrived in Glasgow at 9.35 a.m.; then after a turn round time of only 3 hrs. 55 min. she worked the up "*Mid-day Scot*" back to London. Thus she returned to her home station in 21½ hours, having covered no less than 800 miles, and having been hauled by four different crews.

Some very complicated turns of duty are worked by some of the standard 4–6–0s of the L.M.S.R., including passenger and goods trains. Before the war, 3-cylinder class "5X" engines from Camden shed used to work, first of all, a fast goods to Liverpool; then take a cross-country express from Liverpool to Leeds, via the Huddersfield route. After that came another passenger job back to Liverpool, and finally a fast goods to London. One of the most extraordinary of such duties involved both Scottish and English duties and brought engines from Patricroft shed, Manchester, regularly on to the Glasgow-Ayr expresses.

Before the war some very intensive use was being made of the L.N.E.R. streamlined "Pacifics." One London engine used to take the 7.25 a.m. express from King's Cross to Doncaster, return with the 12.45 p.m. Doncaster to King's Cross, and then after barely three hour's rest take the streamlined "*West Riding Limited*" on its 67 m.p.h. dash to Leeds. This made a daily mileage of over 500.

But even this pales before some of the amazing turns of duty worked by King's Cross and Newcastle "Pacifics" on the Scottish expresses before the war. One "diagram," as these round trips are termed, began with the hauling of the 4 p.m. combined Yorkshire and Newcastle express, from King's Cross to Newcastle. In the course of this duty the engine was manned by a Doncaster crew from London to Doncaster, a second Doncaster crew on to York, and a Newcastle crew on to (*Continued on page 250*)



An express passenger engine in fast goods service. An L.M.S. "Patriot" class 4-6-0 No. 5531 on the pre-war 11.25 a.m. express goods from Camden. Photograph by courtesy of the L.M.S.R.

Forty-Five Years of Railway Photography

II.—My Two Reflex Cameras: Carlisle before Grouping

By H. Gordon Tidey

LAST month I spoke of the good work I turned out with my Sanderson half-plate camera with a focal-plane shutter. I improved this outfit by the purchase of a Goerz "celor" lens working at F4.5, and thus equipped I began to turn out work that I have scarcely bettered in all my experiences.

After some years with this outfit I became interested in the reflex camera and purchased a second-hand "Planex" fitted with a Cooke 8 in. F4.5 lens. This lens I am still using and wish for nothing better, and the focal-plane shutter of this camera

L.M.S. Up "Royal Scot" hauled by No. 6200, of the first "Princess Royal" class, 4-6-2.

was definitely the most efficient of the large number I have possessed. I used this camera for some five years, but eventually its bulk sounded its doom and I exchanged it for a more handy proposition in the shape of a "Mentor" folding reflex, to which I fitted my Cooke lens. This camera was easier to carry than its predecessor and, with occasional relapses when I returned to the Sanderson, it served me until the first World War put a stopper on all such activities.

The plates available in those days, although of what we should now regard as low speed, gave results with very short exposures that are certainly not surpassed by present-day plates and films in spite of the enormous speeds claimed for them.

At the time of which I am writing Carlisle and York were quite definitely the two most interesting stations. In my opinion Carlisle still holds the palm in railway interest, but in pre-grouping days there was nothing like it in the Kingdom.

Imagine oneself on the down (island) platform during the periodical rush periods that occur at many large stations. When facing north, on the left was the side of the platform reserved for L.N.W.R. trains, and on the right that principally for Midland trains. Between these were two or three tracks on which would be standing at the north end perhaps a North British "Atlantic" and a 4–4–0. Behind these a "Caledonian" 4–6–0 and two 4–4–0s coupled together, and behind these again a Glasgow and South Western 4–6–0 and a 4–4–0. On the line beyond would be, facing south, an array of L.N.W.R. engines, "Experiments," "Precursors" and "Jumbos," usually in pairs, waiting for the "up" Caledonian Scots expresses to London, Birmingham and Manchester; also several Midland 4–4–0 engines, "Compounds," "990s," "700s," "Class 2s," and often 2–4–0s of "Class I," used for piloting.

In the bays at the south end of the station would be, on the western side, a Maryport and Carlisle train with a funny little 2–4–0 or 0–4–2, and on the eastern side perhaps two North Eastern trains for Newcastle, headed by 4–4–0s of classes M or Q; while in the bays at the north end of the station would be Caledonian, G and S.W. and North British stopping trains, each with a 4–4–0 locomotive.

Picture all these in beautiful condition as regards paintwork and bright steel and brasswork.

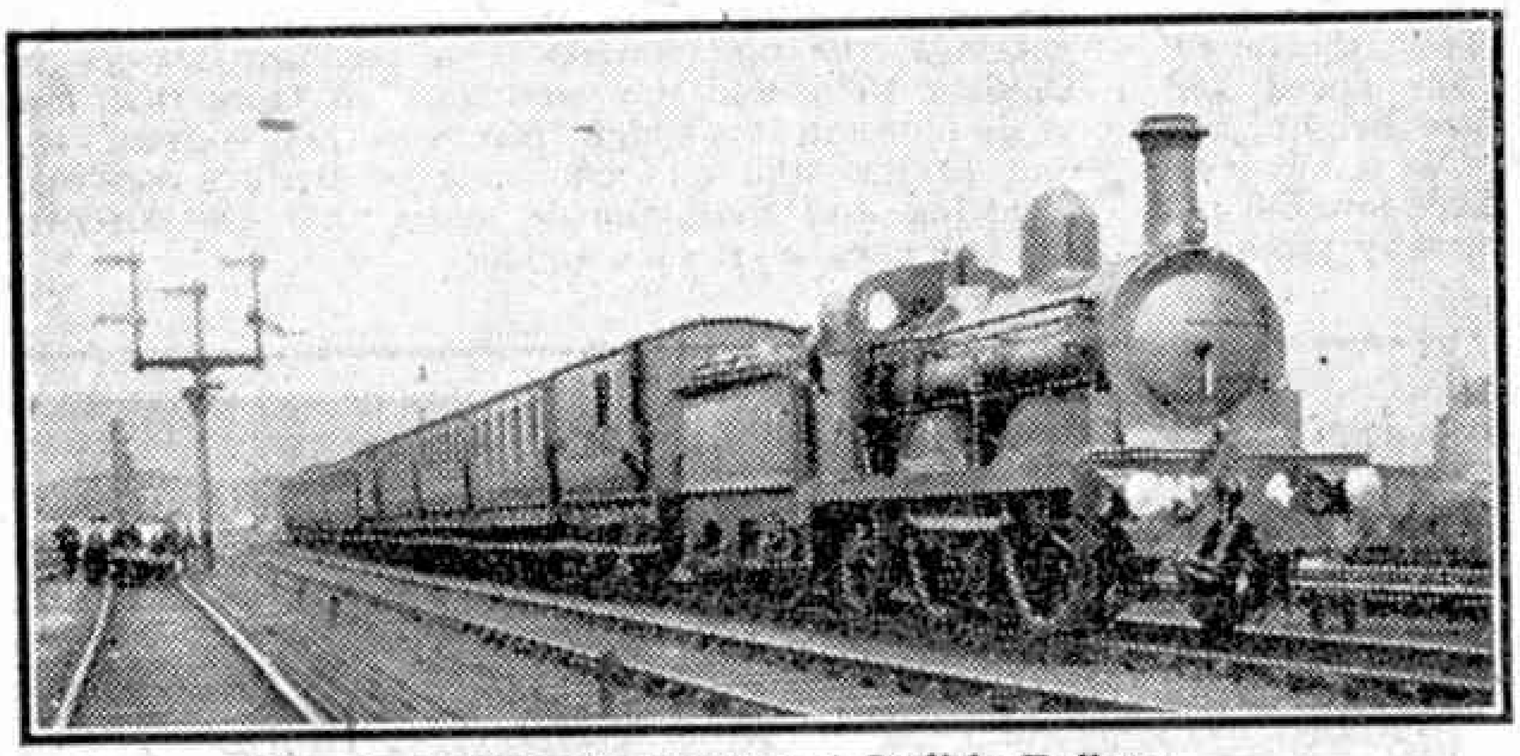
Presently in would come an L.N.W.R. Scots express from London hauled by an "Experiment" piloted by a "Jumbo," and this would be closely followed by a Midland on the right-hand line, with a "Compound," perhaps piloted by a "Class II." These four engines would come off and wait their chance to back through and go to their respective sheds to the south of the

station. The L.N.W.R. train (of West Coast Joint Stock) would now be in charge of a Caledonian 4–6–0, or a pair of 4–4–0s, whilst the Midland would be taken over in two portions, the first by a North British "Atlantic" (for the Waverley route) and the second by a G. and S.W. 4–6–0 for Glasgow by that company's route.

During this time a similar performance would be going on at the up platforms, and in busy holiday seasons, when these trains were often running in two or more portions, one can imagine the indescribably busy scene which occurred at intervals during day and night, because many of the sleeping car expresses arrive here in the small hours of the morning.

Midland Railway Glasgow-St. Pancras express hauled by No. 1010, Deeley Compound of early batch.

At the south end of the station the L.N.W.R. lines start straight up a fairly steep grade bearing to the west, and the M.R. and N.E. use a joint line, which bears by a sharp curve on a down grade to the east and later subdivides. It will therefore be seen that, by dint of a considerable amount of "bank scrambling," one could get across from the L.N.W.R. to the combined M.R. and N.E. and vice versa, in time to obtain shots on each just south of the station; and it will be readily understood that a camera not necessitating the use of a tripod proved a great boon in later years, with trains departing close together, leaving little time to set up and re-focus.



Maryport train, Maryport and Carlisle Railway.

Altogether I visited this fascinating place some five or six times, and during this period there was little alteration in locomotive variety, except that the L.N.W.R. introduced "George the Fifths," "Princes" and finally "Claughtons," which largely replaced older engines. The Caledonian, however, brought out the Pickersgill 4–4–0s and several classes of 4–6–0s.

Shortly after the first World War many manufacturers were devoting attention to perfecting the so-called "Press" camera; that is, a focal-plane camera used at eye level, with a direct-vision wire frame finder. There is much to recommend such a camera, because the viewpoint is such that the resulting photograph is exactly as we see the train, as opposed to that of the reflex, which is taken from the level of the middle of the body. The direct-vision finder is also a boon, when once mastered, and I strongly recommend fitting one to any hand camera having the usual microscopic ground glass or clear vision finder, in which it is frequently very difficult to see the image at all.

Suffice it to say I purchased one, and took the opportunity at the same time to abandon the half-plate size I had been using for so many years in favour of the very useful 10 by 15 c.m. (6 in. by 4 in.), which gives a clear margin round a post-card and saves much weight and expense in plates. I may say at once that I have never regretted making this change, and am still using this camera after some 23 years. In addition I now own a miniature of the same make in 3½ in. by 2½ in. size.

My last visit to Carlisle was about 12 years ago, when I noticed a very great change in locomotive (*Continued on page 250*)

The deep fuselage of the Lockheed Vega "Ventura" is well shown in this rear view of the bomber. In May last "Venturas" of the R.A.F., escorted by "Spitfires," carried out two daylight bombing raids upon coke ovens at Zeebrugge. Photograph "The Aeroplane" Copyright.

Air News

"Lancaster" Bomber Exhibition Flights in Australia

An Avro "Lancaster" heavy bomber has been flown to Australia, and is carrying out exhibition flights to the main cities of the Commonwealth. When this tour is completed the machine will visit New Zealand and there make a similar series of flights. The long flight to Australia was made by way of Canada and the United States, and the Atlantic crossing was accomplished in 15 hrs. 30 min., against a strong headwind. Details of the Pacific lap of the journey have not been issued. The bomber is manned by an all-Australian crew who have taken part in R.A.F. raids on both Germany and Italy.

More "Spitfire" Changes

The Supermarine "Spitfire" IX is being produced with a more pointed fin and rudder of higher aspect ratio, and this has improved control when flying at great height.

The "Spitfire" VB is now in service with the wing tips removed, a modification which was also made in the earlier "Spitfire" III. The shortened, square-ended wings have increased the speed and manœuvrability of the machine at low height, and thus made it even better than before as a low-level attacker. On the other hand they have lowered the rate of climb and the ceiling, and thereby rendered the machine less suitable for air combat at very great heights, a rôle now more ably filled by the altered "Spitfire" IX already mentioned. The removal of the wing tips has shortened the span of the machine from 36 ft. 10 in. to 32 ft. 2 in.

Fifty "Spitfire" VBs, with wing tips, have been delivered to the Red Air Fleet. These machines were flown to their destination by way of Iraq, where their R.A.F. markings were painted out and replaced by those of the Red Air Fleet.

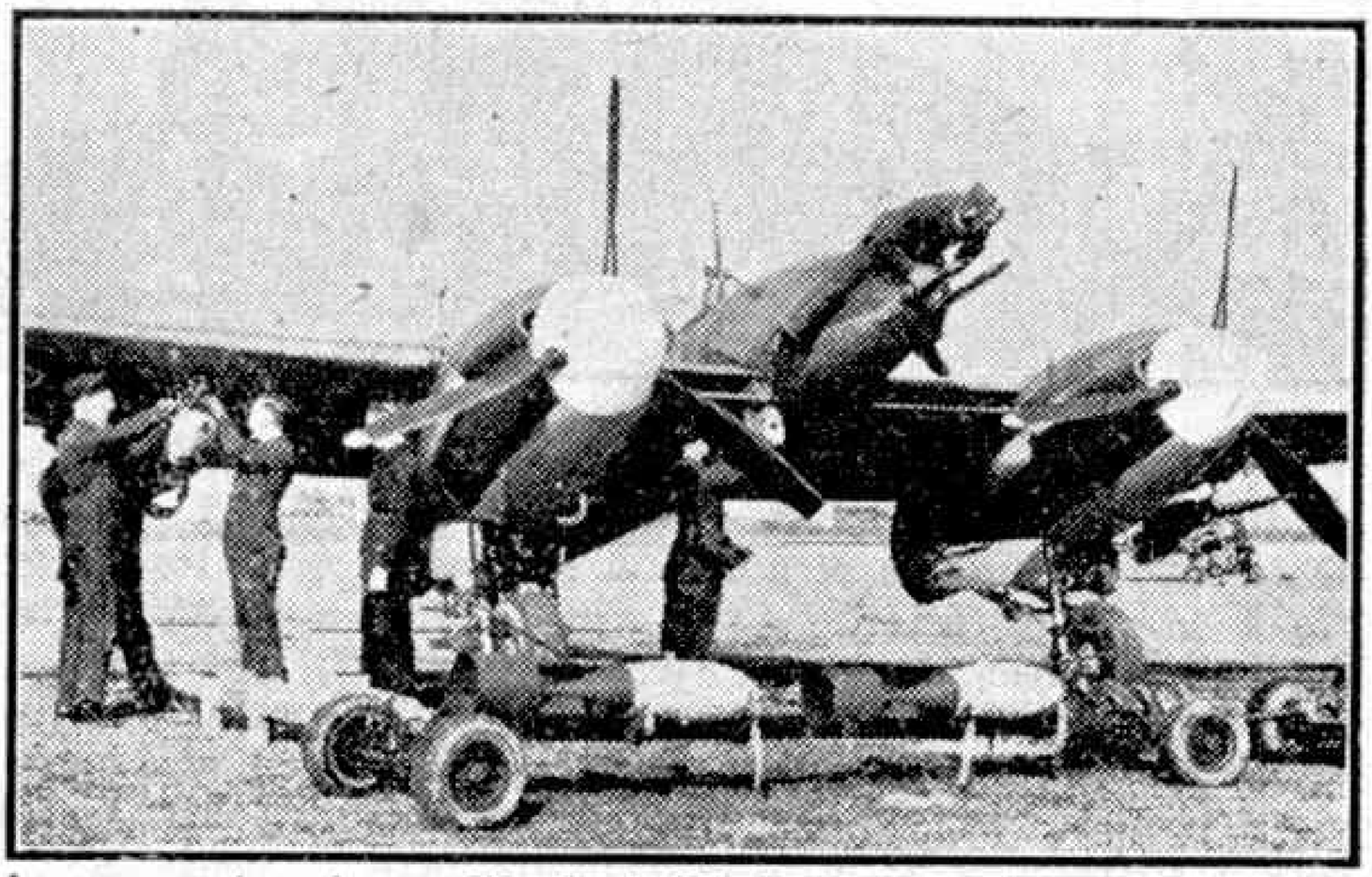
Great Airport in Labrador

The Canadian Department of Transport have issued a few details of the great new airport in Labrador, described as the largest in the world. It has cost about £3,000,000, is situated north of the peace-time Atlantic air routes, and is being used jointly by the R.A.F. and U.S. Army Air Forces Transport Commands, and by the Royal Canadian Air Force. The runways are over a mile long and provision has been made for extending them farther if ever required. The airport is favoured with good weather throughout the year.

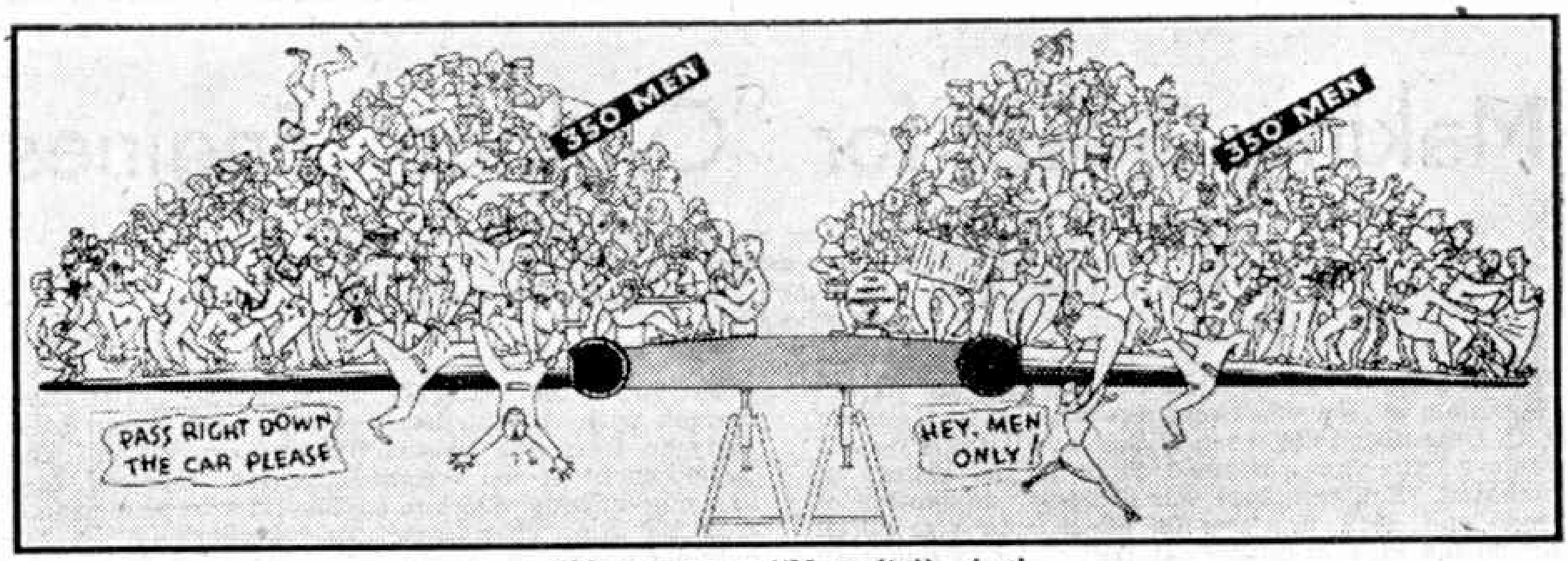
Long Service of British Airways Veteran Flying Boats

A remarkable record of intensive operation of the veteran "C" class flying boats of British Overseas Airways is disclosed by figures which are now available covering the year ended 31st March last. These aircraft are in use on the Durban-Cairo-Karachi-Calcutta route, and on the trans-African "Congo" route between Lagos and Port Bell, on Lake Victoria, Nyanza, where the Congo route joins the Durban-Cairo line. For part of the time certain of the boats operated between the United Kingdom and West Africa.

During the twelve months the flying boats, of which 13 are now in service, have flown a total of about 3,174,122 miles. These figures would be remarkable in any case, but are even more impressive when the age of the aircraft is taken into account. All are veterans, the first having been put into service in October 1936, and the "youngest" is more than five years old; and it is a high tribute to their construction and to the skill and efficiency of British Airways' servicing and maintenance staffs that the aircraft are still capable of such service.



Armourers at work on a Westland "Whirlwind" fighter-bomber. Photograph "The Aeroplane" Copyright.



700 men on a "Mosquito" wing!

Some people seem to be under the impression that a wooden aircraft cannot be so strong as a metal one—that the "Mosquito," for example, would have been stronger had it been built of metal. Actually, of course, the strength factors required are laid down by the Air Ministry and adhered to strictly, no matter what form of structure is employed. As wood is a weaker material than metal, bulk for bulk, it simply means that a spar or other member made of wood has to be larger in cross section than if it were made of metal. Theoretically, therefore, there is less air space within the wing or fuselage of a wooden-built aircraft than a metal one, but in practice there is scarcely any difference. So long as there is more than ample room for crew, fuel tanks, bomb bays, gun bays, radio and other equipment, all is well.

One good feature about the larger bulk of wood is that the holes made by bullets and shell fragments represent a smaller proportion of the member they pierce, and so reduce its strength proportionately less, than if it were a concentrated steel member.

As suggested in the sketch above, the wing of the "Mosquito" (made in one piece from tip to tip) is designed to bear the load of 700 men. If it had been made of metal it would have supported neither more nor less.

Republic "Thunderbolt" Fighter

Another new type of American fighter being used by the U.S. Army Air Forces Fighter Command in this country is the Republic P 47 "Thunderbolt." It is one of the largest single-engined fighters ever built, and has a wing span of 40 ft. 9-5/16th in. It is armed with eight 0.5 in. machine guns, four in each wing arranged in staggered formation. Each gun fires nearly 800 rounds per min.

"Thunderbolts" have been taking part in fighter sweeps over enemy-occupied territory, and have accompanied "Flying Fortresses" on a bombing raid. The new fighter was in the news some time ago when one of them, during an aerobatics test, dived at a speed afterward calculated to have been nearly 730 m.p.h., almost 50 m.p.h. faster than the speed of sound! It is a low wing monoplane fitted with a 2,000 h.p. Pratt and Whitney "Double Wasp" engine with turbo-supercharger, and its top speed is claimed to exceed 400 m.p.h.

American-Built Aerodrome in Britain

The U.S. Army Eighth Air Force recently took over the first aerodrome in this country constructed by America. The work was begun last summer and has been completed 3 months ahead of schedule. The new aerodrome has been dedicated to the late Lieut.-Gen. F. M. Andrews who was Commander-in-Chief, American Forces in the European Theatre of Operations, and was killed recently in a flying accident in Iceland.

Helicopters for Liberty Ships

Successful tests in flying a helicopter from, and landing it back upon, a 20 ft. square platform erected on a tanker have been carried out at Long Island Sound, U.S.A. Col. H. F. Gregory, of the U.S. Army Air Forces, was at the controls, and accomplished 24 take-offs and landings during the test. The helicopter was fitted with pontoons.

The U.S. War Department have now decided that Liberty ships shall be provided with small decks from which helicopters can operate to carry out anti-submarine activities when the ships are at sea.

The Trans-Tasman Air Service

Tasman Empire Airways have published details of the traffic dealt with on their trans-Tasman air service between Auckland, New Zealand, and Sydney, Australia, since it was introduced at the end of April 1940. Up to the close of 1942 a total of 5,095 passengers, 112,713 lb. of freight, and 326,215 lb. of air mail, have been carried in the Empire flying boats employed. The reliability of this important air service across the Tasman Sea is shown by the fact that 394, or 97.52 per cent., of the 404 trips scheduled were flown. The mileage covered totalled 527,760, and there was only one serious mishap.

Success of Air Training Plan

In a recent speech in the Canadian House of Commons, Mr. C. G. Power, Canadian Air Minister, gave some facts about the remarkable progress of the British Commonwealth Joint Air Training Plan. He said that more than 50,000 British, Canadian, Australian, New Zealand, Norwegian, Polish, Czech, Belgian, and United States airmen, and over 75,000 ground crews, has been trained under the scheme. There are now 154 training schools and a total of 10,000 training aircraft.

Atlantic Seadrome Idea Revived

From time to time during the past 15 years or so there has been mention of schemes for establishing a chain of floating aerodromes across the Atlantic. One of the earliest of these "seadrome" schemes was that of Mr. Edward R. Armstrong, an American engineer and inventor, which was described and illustrated in the "*M.M.*" of January 1929. The latest proposal of this kind is reported to have come from the Pennsylvania Central Air Lines, U.S.A., who are said to have applied to the U.S. Civil Aeronautics Board for authority to establish seadromes between the United States and Great Britain. These seadromes would be spaced about 800 miles apart, and be about three miles long, with their vast deck some 70 ft. above the sea. The company claim that the proposed seadromes would ensure the shortest and most economical air route between the United States and Great Britain.

Making Gears for "Cyclone" Engines

For the following description we are indebted to "Trade Winds," the organ of the Wright Aeronautical Corporation, U.S.A. Our cover is based on an illustration also supplied by the Wright Corporation.

THE Wright Aeronautical Corporation had its beginning on the windswept dunes of Kitty Hawk on 17th December 1903, when Wilbur and Orville Wright achieved the first sustained flight in the history of mankind. The aeroplane was a flimsy contraption of wood and cloth, and was launched from a monorail by means of a primitive catapult. The two clumsy wooden propellers were driven by bicycle chains and sprockets from a four-cylinder 12 h.p. engine designed and built by the Wright brothers themselves, and the pilot was required to lie flat on the lower wing, controlling the machine with hands, feet and shoulders. This was no haphazard experiment. For four years the brothers had practised with kites and gliders, developing and proving their theories of flight.

The next few years were spent in developing larger, stronger, and more reliable planes and engines, and in 1908 the first aeroplane was constructed for the United States Army. Unfortunately this crashed during a demonstration flight, killing the Army's first would-be pilot, Lieutenant Selfridge, and seriously injuring Orville Wright. In the following year the Army purchased its first aeroplane and the first Army flight squadron was formed at College Park, Maryland, with Wilbur Wright as flight instructor.

To provide the necessary capital for further production the Wright Company was formed in 1909, and made steady progress until about 1915, when the effects of the World War began to be felt in America, and Wright obtained a contract to build a large number of Hispano-Suiza engines for the Allies. A merger was effected with the Glenn L. Martin Company, bringing into being the Wright-Martin Corporation, which moved into a large factory in New Brunswick, New Jersey. Here, during the course of the war, thousands of Hispano-Suiza engines, or "Hissos" as they were popularly called, were produced.

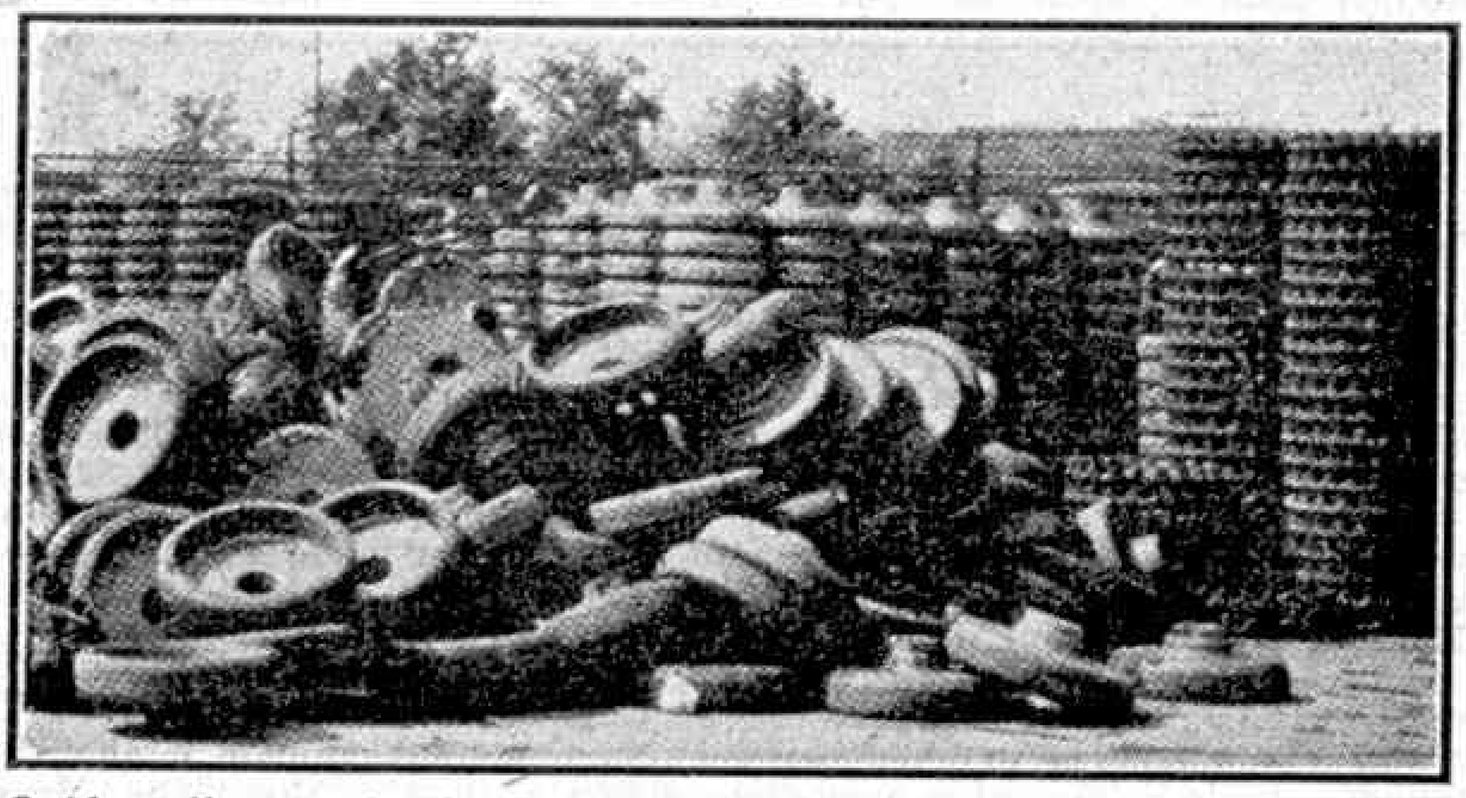
The enforced curtailment of output at the close of the war brought about a dissolution of the Wright-Martin Corporation, and a new company, the Wright Aeronautical Corporation, was created. The New Brunswick factory being too large for the limited production expected, the company moved to Paterson, New Jersey, in 1920, where development was carried on of a series of water-cooled Vee type engines ranging in power from 200 h.p. to 675 h.p. These engines achieved world-wide renown and powered many of the finest and fastest airplanes of their time. The models "E" and "T" were also produced in marine types for high-speed motor boats and scored many successes. Some of them, indeed, are still in service.

During 1920 the Wright company designed and built a nine-cylinder air-cooled radial engine rated at 350 h.p., the first successful high-power radial in America; and three years later acquired by merger the assets and business of the Lawrance Company which was engaged in building very successful air-cooled radial engines. From these early types was developed the famous Wright "Whirlwind" series, the engines that carried Commander Byrd across the North Pole, Lindbergh to Paris, and Chamberlain to Germany.

In 1929 the Wright Aeronautical Corporation merged with the Curtiss Aeroplane and Motor Company to form the Curtiss-Wright Corporation. The development of the Wright "Cyclone" followed, first as a nine-cylinder 525 h.p. engine, later to be increased to 1,200 h.p. Then came the "Cyclone 14," a 14-cylinder engine developing 1,700 h.p., and finally the "Cyclone 18," whose 18 cylinders produce 2,000 h.p.

The planetary system of reduction gearing used in all Wright "Cyclone" engines combines the maximum of strength with the minimum of weight and space.

Let us imagine a Grumman "Avenger" powered by a "Cyclone 14," roaring down the deck of a carrier and lifting into the air as the engine develops its full 1,700 h.p. Inside the "Cyclone" the crankshaft turns 2,500 revolutions per minute; while outside, the propeller turns at a considerably slower speed. This difference in speeds was built into the "Cyclone" because there must be a compromise somewhere between speed and power if the teamwork between engine and propeller is to produce maximum efficiency. Without a third agency in this teamwork the propeller would spin too fast, would waste the engine's power—beyond a certain point would develop dangerous vibration. That agency to effect this compromise between speed and power is reduction gearing.



Outdoor "weathering" of rough forgings from which "Cyclone" gears will be machined.

Within the magnesium nose section of the "Cyclone" is a train of reduction gears that reduces engine r.p.m. to propeller r.p.m. These gears enable the "Avenger" to make the most of its mighty power plant.

The key unit in this reduction train is a set of 20 small pinion gears, connected directly with the propeller shaft. An individual tooth on one of these pinion gears has a face with an area of only .13 of a square inch, smaller than your thumb nail; yet with each contact this small facet of steel transmits one-twentieth of the total engine energy output, or 85 h.p., enough to drive a six-ton truck. Throughout the entire engine, driving the accessories, the magentos, turning the supercharger at speeds up to 24,000 revolutions per minute, linking the starter with the crankshaft, other gears perform similar yeoman service.

Gear making is an art, requiring vast amounts of special machinery and long years of research coupled with practical experience. For this reason, many

Burring is done to round off sharp edges that could be starting points for "fatigue cracks."

manufacturers of engines and industrial products in general subcontract their gear manufacturing to companies specialising in this field. Wright Aeronautical, however, make all of their own gears. In the realm of Wright Aeronautical production in New Jersey, one entire plant is devoted exclusively to gear manufacturing, including every step from start to finish in the progress of changing a hunk of rusty weathered steel into a super-finished precision product, ready to become part of an engine with an output of as much as 2,000 h.p.

The rusty and weathered beginning of a "Cyclone" gear is deliberate. Like shirts, steel has a tendency to shrink, even after it has been forged; so gear blanks are stacked out in the open to age or "season"—contracting and expanding with temperature changes and gradually settling down to a more or less fixed size—before any machining is begun. The seasoning is followed by a normalising and hardening step to eliminate shrinkage.

Gears are heated in a continuous oven at temperatures of from 1,200 to 1,700 degrees, depending on the part involved, and then quenched in an oil bath. This quenching is the most spectacular operation in the entire gear plant. Cherry-red, almost white-hot, the gear blanks emerge from the oven and are automatically lowered by a conveyor into a vat of oil. Flames and acrid smoke flash up as metal touches oil. But the quenching oil has such a high "flash point"—the temperature at which it will burn freely—and is kept so constantly agitated by compressed air shooting out from a pipe in the bottom of the vat, that the flames die down when the forgings sink under the surface, and a few seconds later completely disappear.

After normalising the heat scale is cleaned from a small area on each part, and inspectors test the surface to determine if the metal is of the proper hardness. If all is well, the forging moves on to the first battery of machine tools; the preliminary stages have been completed, and each succeeding step—machining, plating, shaping the teeth, hardening, grinding, lapping, polishing and inspection—carries the gear in a direct line towards the assembly floor.

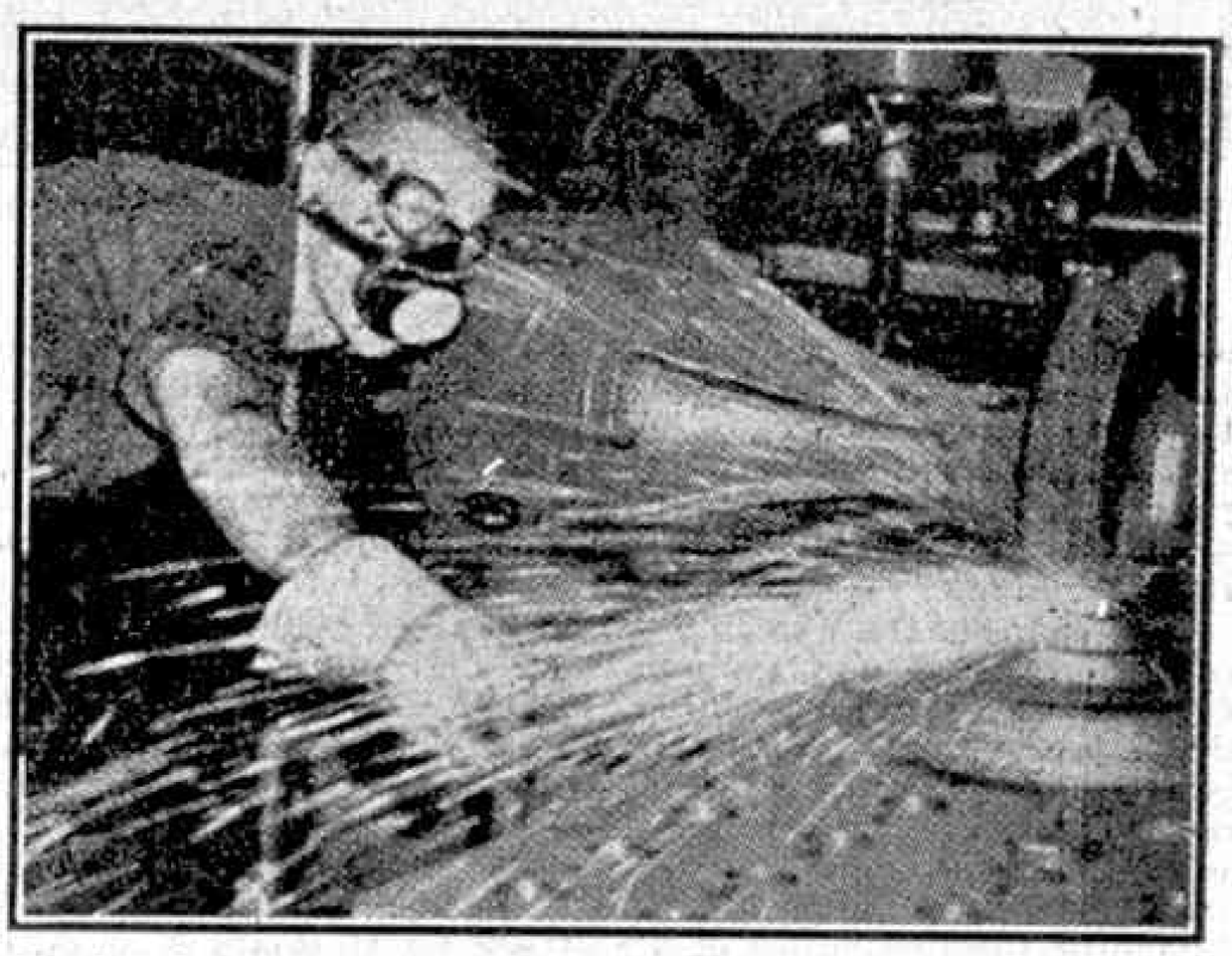
The machine shop section is similar to that in other plants—high-production, single-purpose machine tools to complete every process of turning, facing, boring, drilling, etc., with all the tools arranged for "in-line" production, and a separate production line set up for each type of gear. Coming off the end of one of these lines, a gear-in-the-making begins to look exactly like a gear, except that it has no teeth. Before the teeth are shaped, the gear goes to a plating department, a highly important step in building in the hardness and quality required for aircraft engine use.

Gears are hardened by two different processes; carburising and nitriding. In the carburising process, the gear is heated in the presence of free carbon, which is absorbed into the steel and then fixed there by a final heating and quenching operation. The nitriding process is similar to that used in hardening cylinder barrels. The part to be hardened is heated for approximately 50 hours in the presence of ammonia gas; the 1,000 degree temperature to which the oven is raised breaks down the gas and releases nitrogen, which is absorbed in the steel to form a glassy-hard surface.

Only the teeth, however, are to be hardened, and to protect the remainder of the gear from the hardening operation the entire blank is coated with either copper plate or tin plate—copper for carburising and tin for nitriding. Wherever the plate is applied, it nullifies the effect of nitriding or carburising. Plating the entire gear blank, then cutting the teeth, accomplishes the neat trick of leaving bare steel on the tooth area to be hardened, and protective plating over the rest of the part.

The tools that cut teeth in a gear have the involute shape of a tooth itself. They cut the teeth to a form adopted by Wright Aeronautical a number of years ago when it was realised that, if higher horsepower was to be attained, gears would have to be made stronger and yet at the same time lighter. One of the weak spots in early teeth had been the root fillet, the angle at the base of each tooth face. Formerly the clearance space between teeth had been left flat, with only a slightly rounded fillet at the starting point of the sharp upward angle of the tooth face. Packing extra horsepower into engines meant packing extra stresses in, too, and these stresses quickly attacked the weak points of the fillet.

Wright Aeronautical engineers developed a gear in which the entire fillet was rounded and blended with the involute form of the tooth, leaving no sharp break where stress might concentrate. All cutting



Sparks fly as spot on unfinished surface of a reduction gear is ground.

tools have this involute form, and, working with a moulding movement on the gear blank, shape the gear until the teeth are within from six to eight thousandths of an inch of ultimate size.

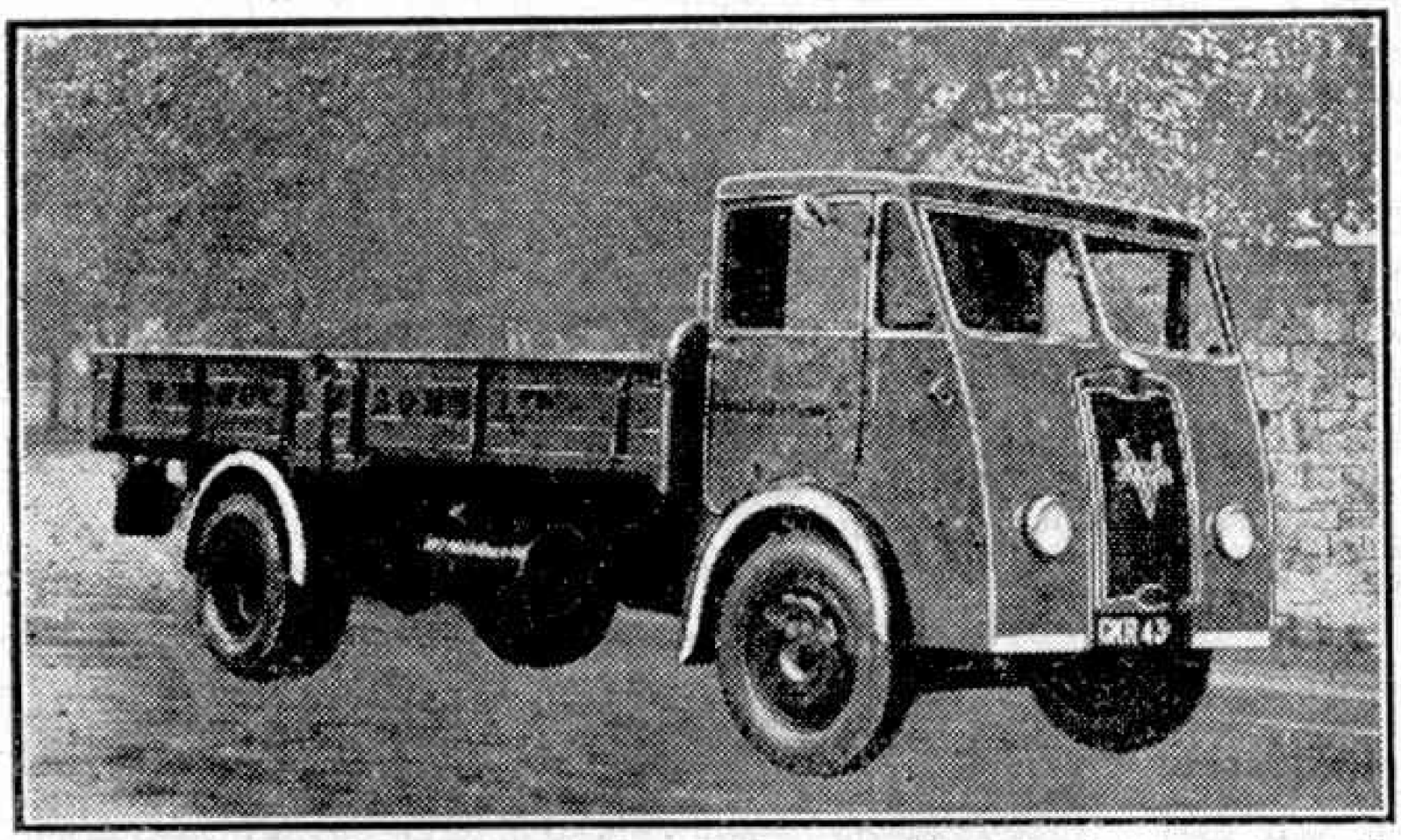
This oversize of .006 to .008 inch is left to be removed after the hardening process. Consequently, many acres of floor space in Wright plants are covered with gear grinders. Wright Aeronautical's quantity production of engines, the large number of gears in each engine, the fact that each gear tooth must be individually ground, (*Continued on page 250*)

Engineering News

The Vulcan "Six-Tonner"

The illustration on this page is an example of the Vulcan 6-ton lorry, a popular model that has proved its capabilities. In its latest form this incorporates many interesting improvements, among them a new type of radiator with greater water capacity, easier steering, with a spring steering wheel, a splined shaft on the starting handle for quick dismantling, and push-on greasers. The hand brake is now operated by rods instead of cables, and the rear brake drums have been stiffened up to give greater efficiency in operation.

Another interesting feature is that the near front wing is detachable, thus giving easy access to the engine, and in the latest model this fitting has been strengthened and made easier to manipulate. The cab is of a new type, with bucket seats and ample leg room for both the driver and his mate, while stronger and improved steps for use in climbing into the cab are now provided. The windscreen is deeper, giving better all-round vision, and new type steel window frames are fitted. Minor details of interest are a lock on the off side door and a bolt on that on the near side.



The Vulcan 6-ton lorry, described on this page. Photograph by courtesy of Vulcan Motors Ltd.

The engine of the Vulcan 6-tonner has four cylinders, of 102 mm. bore and 140 mm. stroke, giving a total cylinder capacity of 4,576 c.c. At 2,800 r.p.m. it develops 78 h.p. A four speed gear-box with reverse is fitted, and third gear in constant mesh, with sliding dog operation.

Beating the Submarine

One of the difficulties of air attack on U Boats is the existence in mid-Atlantic of a gap of several hundred miles that so far has not been covered by land-based aircraft. There submarines can lurk in the knowledge that they cannot readily be discovered, awaiting the passage of convoys. The use of V.L.R., or very long range aircraft promises to reduce the gap, and in addition special escort carriers have been built to accompany convoys. These are auxiliary carriers, originally designed as merchant vessels, and altered to enable them to carry both "Seafires" and "Swordfish," the former as fighters and the latter as anti-submarine patrols.

The vessels are the product of United States shipyards. Full details of course are not available, but it is said that in H.M.S. "*Battler*," the first of them, the flight deck has been built over the original hull. The fittings of the escort carriers are American in range and type. For instance, hammocks have been replaced by bunks, all the fittings are of stainless steel, and there are a well-appointed hospital, a laundry provided with electrical machinery, and a barber's shop that is pleasantly decorated. All orders are given through a loudspeaker installation.

Producer-Gas Buses Save Two Million Gallons of Petrol

At least 2,000,000 gallons of petrol will be saved by the conversion to producer-gas this year of 651 buses running in the Tilling group of companies throughout the country. It was in the spring of 1938 that Tillings purchased the first producer to be used for buses in Great Britain, and experience has shown that by a strict observance of servicing routine producer-gas buses can leave their stations, do their journeys and return home in the evenings as regularly as their predecessors. In a give-and-take service over country that is not too difficult, an average speed of 15–18 m.p.h. can be relied upon.

Drinking-water from the Sea

Thirst is one of the greatest causes of suffering to seamen whose ships have been torpedoed, compelling them to resort to life-boats. The need for fresh water in these conditions is being met by the introduction of special forms of apparatus for distilling sea water, and these are remarkably effective. One of them, known as the Dirshel still, is 33½ in. in height and 11 in. in diameter, and works automatically, once it has been filled and lighted, as a constant level device for the oil fuel is included. It burns paraffin, and one charge is sufficient for 60 hours of operation. About 3 gals. of sea water an hour have to be added to the reservoir of the still, which yields 3½ pints of fresh water an hour. A smaller version produces 1 pint of drinking water an hour.

Another type of freshwater still has been introduced by the Ministry of War Transport and has already been fitted to the life-boats of many ships. It uses a patent fuel that is not affected by immersion in sea water, and is supplied in 10-lb. blocks. The still is small and compact, producing 5 pints an hour, and the equipment can be used for providing hot drinks, for drying clothing and for making smoke signals. A third still, developed by the Admiralty, has an output of a gallon an hour. This uses paraffin; a special form when tried with pitch pine used 4 lb. of wood for a yield of 4 pints of water.

Buying a Bridge

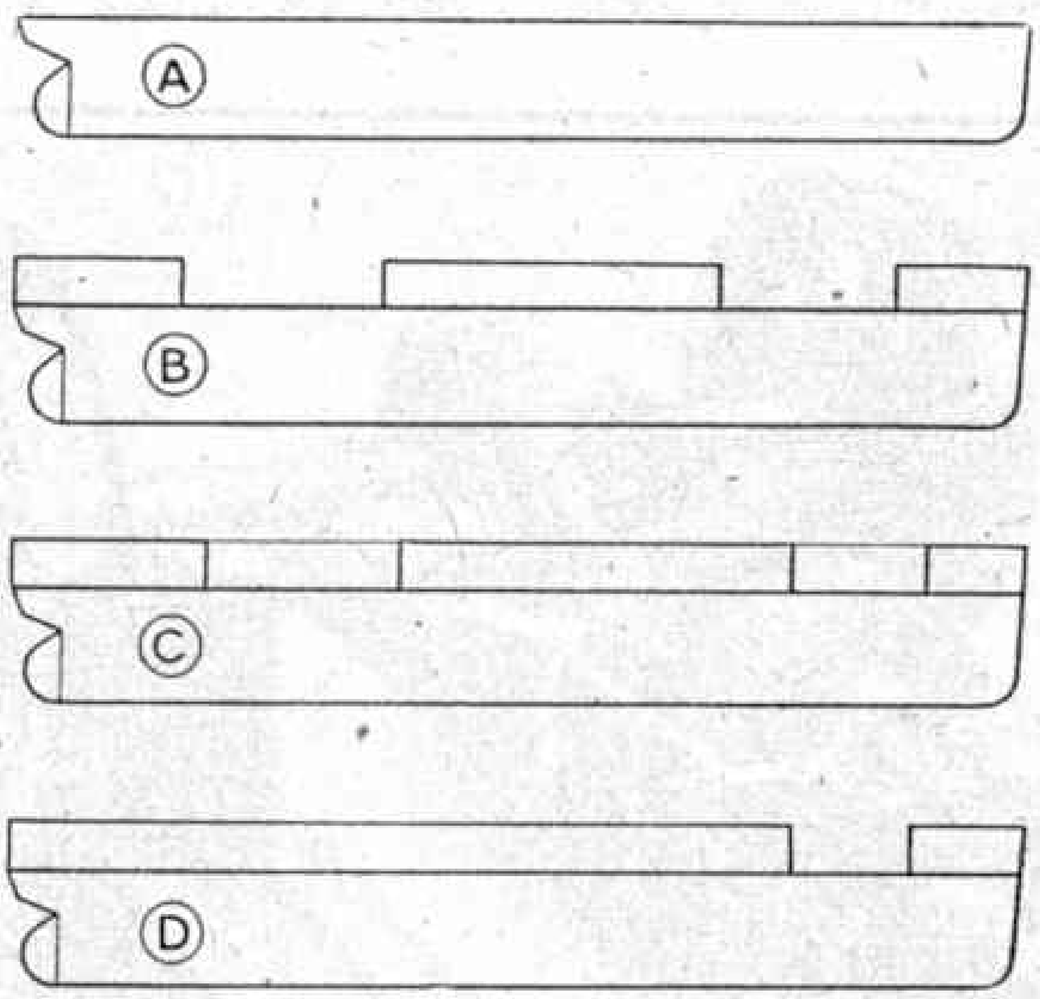
Canton, a town in North Carolina in the United States, found it necessary to do something about a bridge that was no longer strong enough to carry modern traffic. The usual plan in these cases is to reconstruct and repair if possible, but materials for this could not be obtained owing to war conditions. The town authorities therefore bought an entire railway bridge that had been abandoned in Tennessee. This was dismantled and parts were taken to Canton, where they are now being re-erected.

Have You Ever Thought About This?

III.—What is a Ship's Tonnage?

WE hear a lot about "tonnage" these days. What is it? It may be described as a system of measurement used to indicate the capacity of a ship.

The tonnage of a vessel can be expressed in various ways. "Gross tonnage" is the total cubic capacity of a ship measured to the tonnage deck, which is the upper deck in ships with less than three decks, and the second continuous deck from below in all other merchant ships. It includes also the capacity of all permanently closed-in structures above the tonnage deck, such as poop, bridge, and forecastle in a three-island ship. That sounds a real mouthful, but it is not so bad if we put it another way—the gross tonnage of a ship represents the amount of cargo it would carry if all permanently-enclosed spaces were filled, regarding cargo as measuring 100 cu. ft. to the ton.



Structural types of ships: (a) single-deck; (b) three-island; (c) awning deck; (d) well-deck.

"Net tonnage" is the gross tonnage less the tonnage of the actual space occupied by the crew and the machinery. It is on this tonnage that pilotage dues, dock and harbour dues, etc., are based.

"Displacement tonnage" is the measure of the weight of water displaced by a vessel when afloat, and therefore is equivalent to the actual weight of the ship. This tonnage is used for the measurement of warships.

While we are on this topic let us have a look at the way a ship is measured.

The length of a ship may be stated in two different ways. First there is the "overall length," the full length of the ship between the forward and aft extremities. Then there is "length between perpendiculars," measured from the forward side of the stem post to the aft side of the stern post at the upper deck. There is a considerable difference between these measurements, and this is the cause of what appear to be conflicting statements in regard to the length of a ship.

The "extreme breadth" of a ship is measured over the outside plating at the greatest breadth of the vessel. "Breadth moulded" is the greatest breadth measured over the frames.

"Depth moulded" is measured at the middle of the length of the ship from the top of the keel to the top of the upper deck beams at the side of the vessel; or in an "awning-deck" or "shelter-deck" ship, from the top of the keel to the top of the main deck beams at the side of the vessel.

"Draught" is the depth of the submerged portion of the hull.

Now somebody will be saying: "What's all this about 'awning-deck' and 'shelter-deck' vessels?"

The early iron ships were of what is known as the "single-deck" type; that is they had one deck above the double bottom. Subsequently, in order to provide shelter, erections were built forward, amidships and aft, resulting in what is known as the "three-island" ship, with poop, bridge and forecastle. The next step was to fill in the wells between forecastle and bridge, and bridge and poop, with structures of a portable nature, primarily designed for the protection of cattle carried in the wells; this resulted in the "awning-deck" type. Later the temporary filling-in structures were made permanent, producing a vessel of the "shelter-deck" type. A "well-decked" vessel is a development of the three-island type in which the after well only is filled in.

Merchant ships bear draught markings at stem and stern to indicate the amount of the ship's hull below water at that point.

Now you know all about how ships are measured. Or do you?

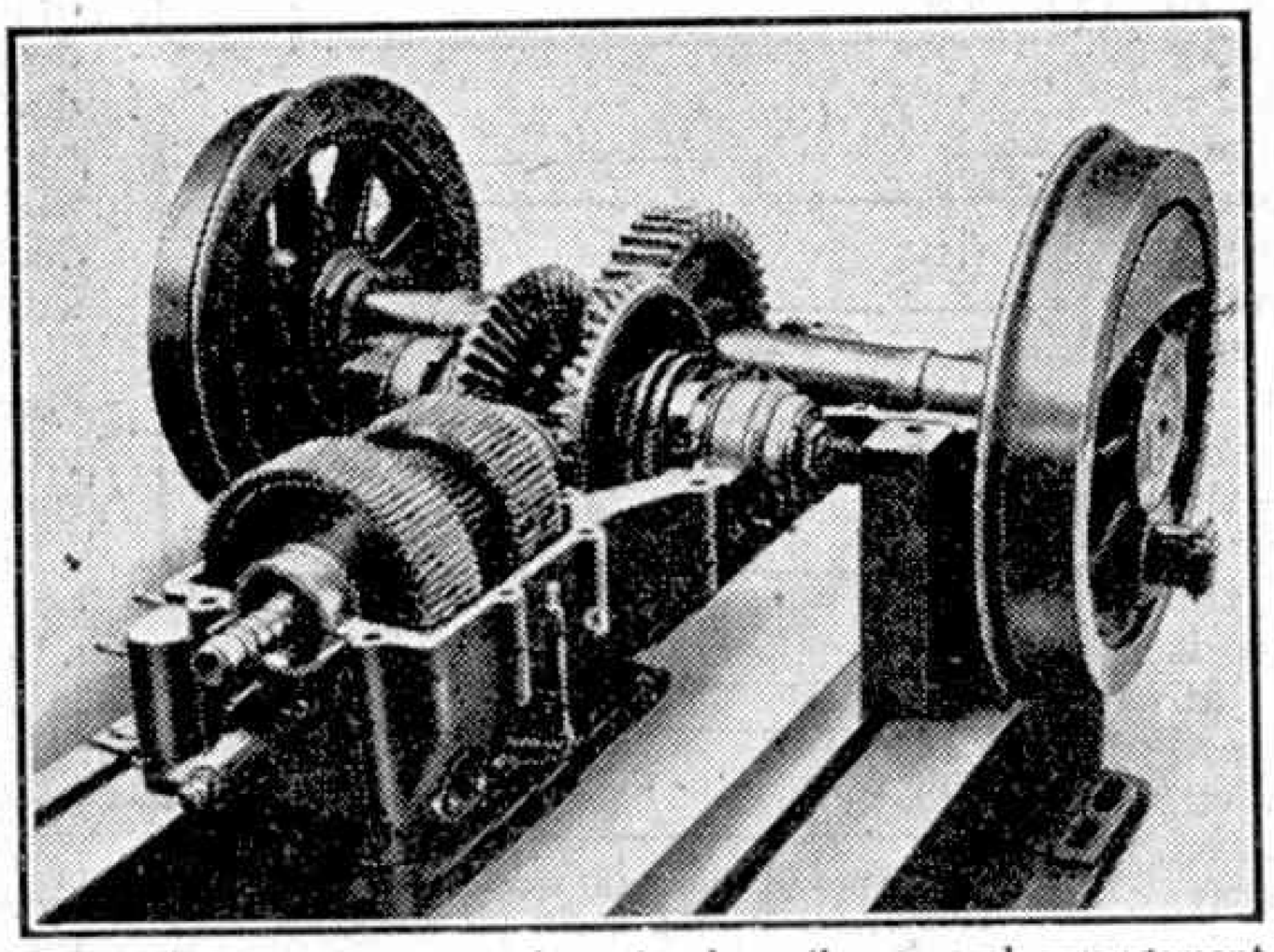
The Diesel Engine Locomotive

II.—From Power Unit to Driving Wheels

By D. Rebbeck, M.A. (Cantab.), A.M.I.Mech.E.

WHEN we consider the drive of a steam locomotive we see that the pressure of the steam acting on the piston is transmitted direct to the driving wheels through the piston rod and crankshaft. In other words, the drive is called "direct." As far as Diesel engines are concerned, however, the matter cannot be dealt with quite so simply, and the reason is briefly as follows.

When a Diesel engine locomotive is at rest and then slowly begins to move, while coupled to a heavy load, the initial starting torque or turning power required is very large, and therefore the Diesel engine must be able to deliver a high output of power in order to overcome this enormous resistance, or inertia, of a heavy train at rest. Now a small Diesel engine, in order to give out a large amount of power, or develop a large horsepower as engineers say, must be running at a fairly high number of revolutions per minute. This is just where the snag arises as far as the Diesel locomotive drive is concerned. The Diesel engine must run fast in order to develop the necessary power, and yet we must somehow transmit that power from a fast-running engine to the stationary driving wheels of the locomotive. If we were to try to use a huge friction clutch, like a large edition of the one in father's car, we should most certainly burn it out at the first attempt; remember that we are going to start off a train weighing very probably several hundred tons.



The S.L.M. gear-box opened up to show the general arrangement of the drive to the locomotive wheels.

Well, the engineers and designers had to get over this problem somehow. In the steam locomotive they put full boiler pressure on the piston to get the necessary force to start the train, but they cannot do that in a Diesel locomotive; therefore they designed various forms of drive to supply the necessary "cushion" effect between the high "revving" prime mover and the driving wheels of the locomotive.

The most popular and most reliable form of transmission in Diesel engine locomotives is the electric drive. In this the Diesel engine is directly coupled to a generator, which supplies current to motors driving the axles through spur reduction gear. The engine is started by using the generator as a motor, the current being supplied by a storage battery mounted in the tender. An auxiliary generator, driven by the Diesel engine, supplies current for exciting the main generator shunt field, for charging the battery, and for auxiliary services.

An important characteristic of electric transmission is that the Diesel engine may be run continuously at full speed however low the speed of the train may be. Full engine horsepower is thus available over the whole range of normal running speeds, this being a particularly valuable feature when high tractive efforts are required at very low train speeds. Other features are the reliability of electrical equipment, simplicity of control and low maintenance cost, making the Diesel-electric drive an attractive proposition for railway locomotive services, and explaining why it is so extensively adopted.

The train speed controller is a simple rheostat, connected in the main dynamo shunt field circuit. It is provided with a "dead man" handle device. The control equipment also includes a train direction reversing switch, an engine speed-setting switch, engine starting and stopping buttons, overload protective devices and the necessary indication instruments.

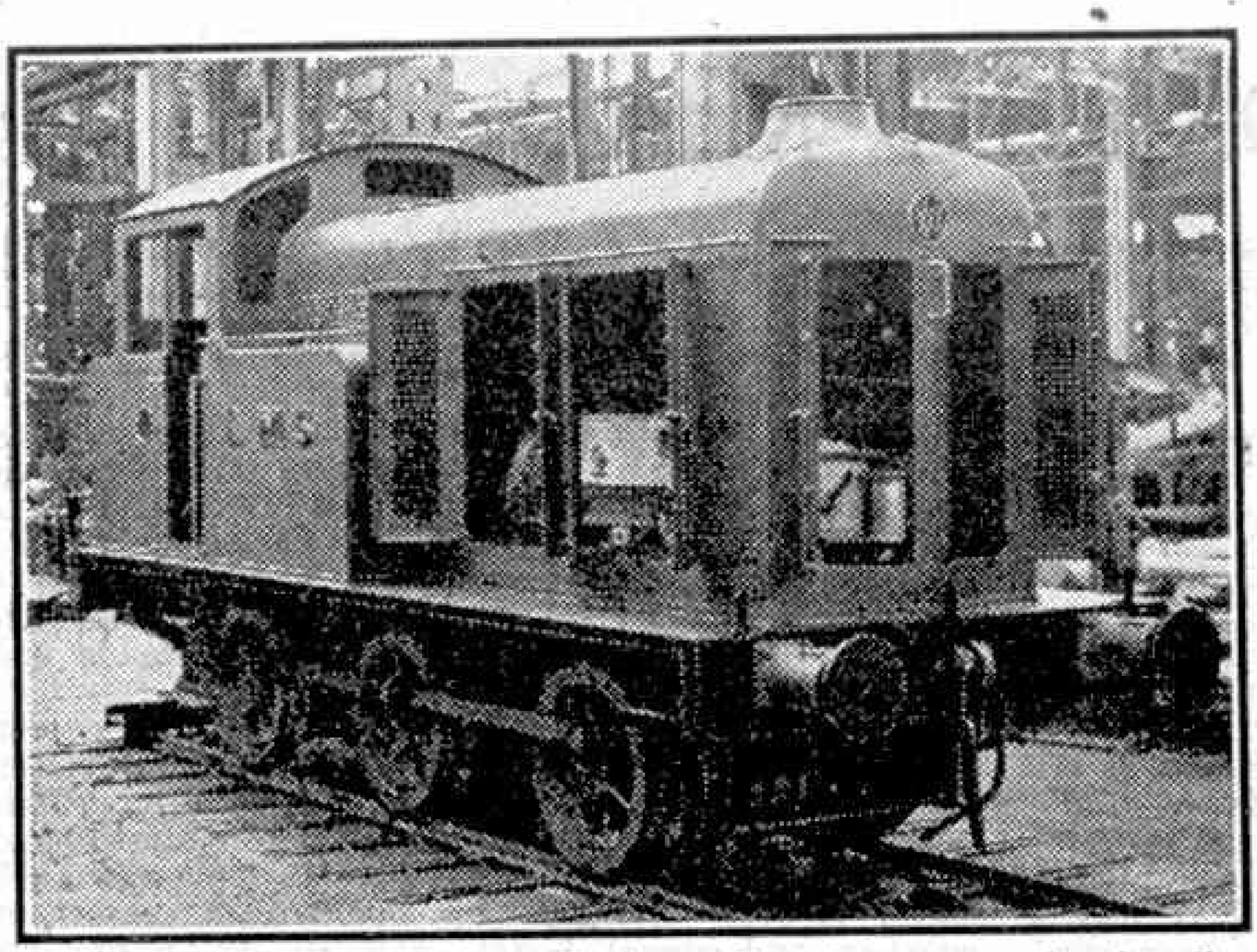
In locomotives with one cab only, two driving positions are provided facing in opposite directions, a set of main controls being fitted at each position. In locomotives with a cab at both ends a complete control equipment is fitted in each cab.

When required, locomotives may be fitted with multiple control. This enables two locomotives to be used, one placed at each end of a train, both being driven by one man from either end. Uncoupling at terminal stations is thus avoided.

Diesel-electric locomotives can be provided with a self-regulating control to make the maximum output from the Diesel engine available under all conditions; and at the same time to safeguard the engine from overloads due either to steep gradients being encountered, or to the driver endeavouring to obtain a higher speed from the locomotive than the tractive resistance at the moment permits.

In Diesel-electric locomotives with constant-speed engines the controller varies the amount of resistance in the field of the main generator, so varying its voltage and output. When the locomotive is started from rest, the controller is normally moved to a position in which the value of resistance left in series gives the required initial tractive effort. As the train speed increases, it is necessary gradually to cut out resistance from the generator field to maintain the tractive effort. If, however, the controller handle be moved too quickly, the generator output becomes too high and excessive power is demanded from the engine. On the other hand, if the handle is moved too slowly, the permissible acceleration is not obtained. By suitably designing the main generator it is possible to make it self-regulating to some extent, but skill in driving is still required to obtain the maximum output without overloading.

As the train speed increases, the speed and voltage



L.M.S. shunting locomotive with inspection doors open, showing the Diesel engine.

of the auxiliary exciter, and with them the excitation of the main generator, increase correspondingly without action on the part of the driver. The system is therefore automatic, and the train will accelerate up to full speed. If a gradient is encountered the natural slowing-down of the locomotive will reduce the speed of the auxiliary exciter and therefore the voltage of the main generator, so that under all conditions of train resistance, throughout the full range of normal running speeds, a constant load is maintained on the engine within 5 per cent. On the other hand, if the driver wishes to reduce the locomotive speed or run the engine at a reduced load, he can do so by moving the controller back from the full-speed notch.

For locomotives from which a very high initial tractive effort is required, series-parallel control is commonly used. At low speeds the traction motors are connected in series, and at higher speeds in parallel. Under the system described, the change from series to parallel working is made by the controller in the normal manner, the necessary adjustment of the auxiliary exciter field strength being accomplished by the same action. The engine load regulations is thus rendered entirely automatic throughout each of the two working ranges.

For the lower powers up to 300 brake horse power various forms of mechanical drives are fitted in Diesel locomotives, and in railcars, such as:

(1) Gear-box fitted with gears in constant mesh and synchronising gear to facilitate gear changing, together with a hydraulic coupling (fluid flywheel) between the engine and gear-box.

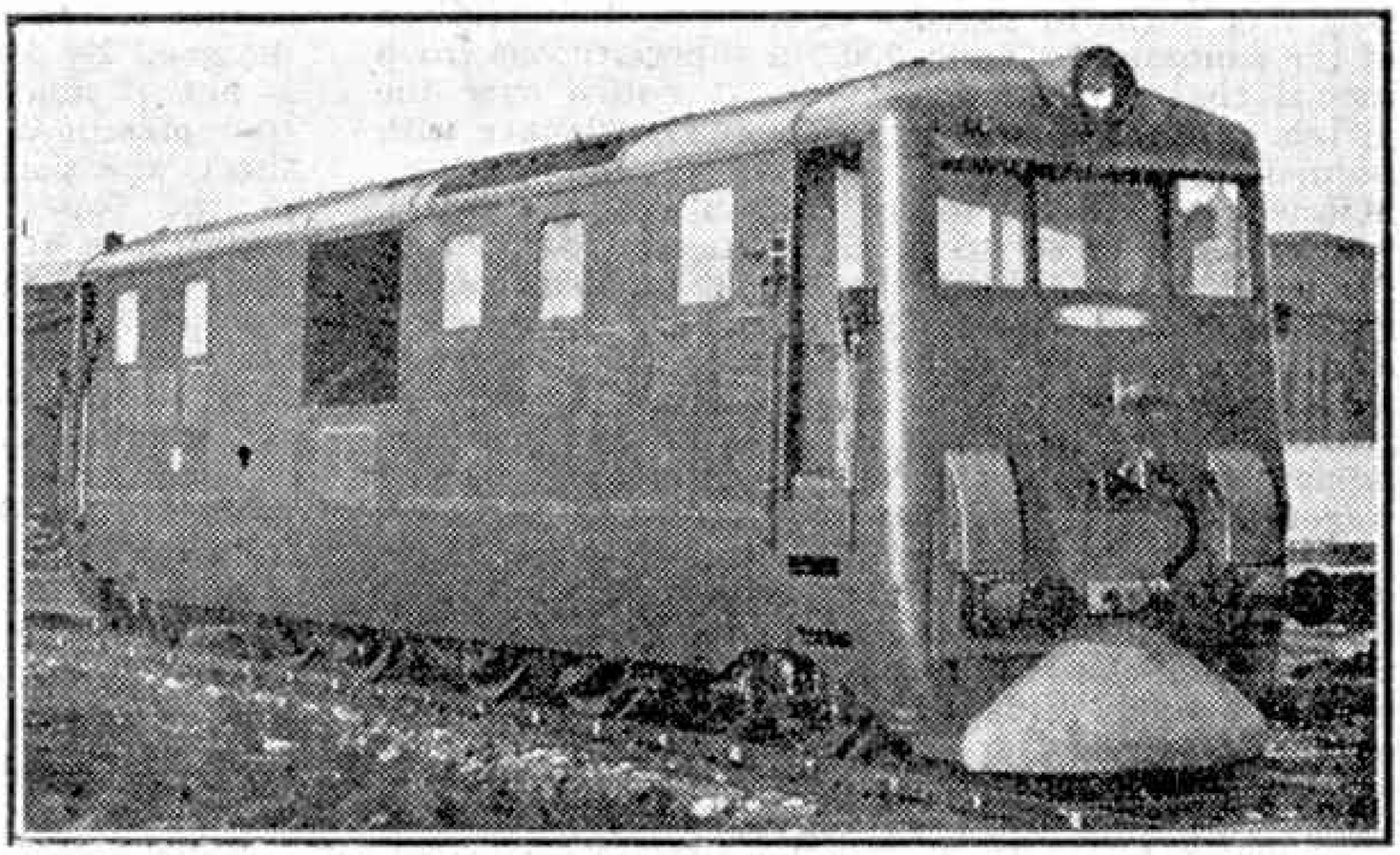
(2) Epicyclic gear-box.

In each instance a reversing gear is incorporated either in the gear-box or in the final drive casing.

The final drive may be through a bevel or a high efficiency worm gear driving on to one of the axles, or through a worm-driven jack-shaft with coupling rods.

A form of mechanical transmission which has given excellent results in locomotives and railcars over a number of years is the well-known S.L.M. gear, an illustration of which appears on the opposite page. The essential feature of this gear is the change-speed couplings operated under oil pressure supplied by a pump incorporated in the gear. The number of speeds required for any unit varies according to the service conditions imposed, but normally there are four or five. The working of the unit is very simple. All gears are constantly in mesh, each pair having its own clutch within the wheels on the secondary shaft. The interior clutch plates can move axially on longitudinal splines, while the toothed wheels, which form the receptive halves of the friction clutches, run loose on the hubs of the clutch plates when disengaged. The engagement of any particular set is effected by an oil distributing cock, which directs the oil pressure into the spaces between the inside faces of the clutch plates, and moves them into contact with the clutches on the toothed wheels. The cock is so arranged that while one coupling is being engaged all the others are automatically disengaged, and the starting is smooth, noiseless and without shock. Though this may sound rather complicated, it is in reality very simple.

Another form of transmission which is coming into prominence at the present time is the hydraulic torque converter. This consists in principle of the impeller of a centrifugal pump mounted in the same casing as the runner of an oil turbine; between the two is mounted a ring containing stationary reaction blading. The whole casing is filled with oil, the engine being connected to the pump side of the torque converter while the driven side is connected through a reversing gear-box and worm drive to the locomotive wheels. The engine is run at an approximately constant speed, and the torque converter is so designed that when the vehicle is moving at full speed there is a comparatively small slip between the impeller and the runner, so that a comparatively small torque is transmitted. When, however, the vehicle is starting from rest, there is a large slip, resulting in a high tractive effort being transmitted.



A mixed traffic Diesel locomotive for the Buenos Ayres Great Southern Railway nearing completion.

The effect of the torque converter is therefore the same as that of a continuously variable self-changing gear, in that it gives a high output torque at low vehicle speeds and a low torque at higher speeds. It is a type of drive which we may expect to hear much more about in the future.

Opinions differ as to the most suitable form of transmission for Diesel engine (*Continued on page 250*)

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 6d., for postage.

"FACTS ABOUT BRITISH RAILWAYS IN WARTIME"

(British Railways Press Office. 1/-)

The 1943 edition of "*Facts about British Railways in Wartime*" is presented in a new form which brings it into line in respect of size with other official wartime publications. It is a great advance on previous editions in that it is illustrated and they were not, and there is space sufficient to describe, as far as is permitted, the great part that British railways have played, and are still playing, in the war effort. To meet all the pressing demands of transport in wartime under the specially difficult conditions that have become the rule since September 1939 has been the biggest achievement in the history of transport. The "lines behind the lines" have been kept open in spite of black-out and bomb damage, for railways are targets of the first importance.

Naturally it has not been possible to compress into 64 pages the whole story of the railways' war achievements, but the contents of the booklet offer a choice of reading on the subject of rail transport in war, and these are illustrated with 53 excellent photographic reproductions. We read of the traffic control system on each line, and between one line and another, and a remarkable example of how this works in practice is given in a description of the running of "Train 300," a supposititious troop special that is required to run at notice over the metals of three companies, without interference with normal traffic.

Reference is made to the Central Wagon Control, which has reduced to a minimum the number of "empties" to be hauled; the special problems of the London Passenger Transport Board, and the developments necessitated by the growth of war production and the dispersal of industry. Food trains, fuel trains and ambulance trains are dealt with, and there are fascinating details of the railways' equipment, special wagons and locomotives.

Improvements costing £314,600,000 were made during the years prior to the war. Many others have been carried out during the war period itself, including the provision of new lines, passing loops and extensions to marshalling yards and sidings, the construction of special stations for war workers and the addition of new facilities for handling loads of all kinds and sizes. This work has been done efficiently and with noteworthy despatch—one section of line was quadrupled in 12 months instead of the 30 estimated—and with the pre-war improvements already referred to has enabled the railways to bear their special burdens.

A very fine idea is given, by description and illustration, of the special wartime traffic, both passenger and goods. The locomotives that haul the trains are concisely dealt with, and evidence of their quality is given by the astonishing loads they haul and the hours of service of both old and new types. The mileages of some of these engines is remarkable; freight engines of the G.W.R. record 1,500 miles between Mondays and Fridays, and 100,000 miles are run frequently between general repairs. Track maintenance under wartime strain and signalling also are dealt with, and there are many interesting details of the docks and steamships of the railway companies, which are playing a vital part in our war effort. How the railways have organised air raid and fire fighting services also is explained, and a thrilling section of the booklet gives some idea of the speed with which repairs have been made and lines cleared after raids.

Then we come to the railwaymen and railway women themselves, and a fine tribute is paid to their devotion to duty and to their courage. Finally we have four pages of "Facts in Brief," forming a ready-to-hand reference to the busiest junction, the longest tunnel, speed records, numbers of locomotives, passenger coaches and signal boxes, and so on, impressive figures that illustrate the immensity of the railway services needed by a great country in wartime.

The booklet is fascinating and interesting, well produced and fit to take its place alongside the epic stories of the other Services.

Owing to wartime difficulties, it is impossible to guarantee prompt delivery of books ordered as described at the head of this page, but every effort will be made to ensure speedy despatch.

"THE AIR CADETS' ASTRONOME"

By C. J. GRIMWOOD, B.Sc. (Eng.)

(George Allen and Unwin Ltd. 1/6 net)

All who are interested in the night sky, and especially air cadets and others who wish to know something about the stars and their use in navigation, will welcome the simple astronome that can be built from the chart designed by Mr. Grimwood. A star map on paper is not of much use, partly because it is impossible to represent a curved surface adequately on a flat sheet, and partly because variations in latitude and in the season bring with them changes in the appearance of the sky itself. A dome is necessary, and this is the form adopted by Mr. Grimwood, who provides an ingenious star map that can be cut out and given the correct shape, and then mounted so that it can be rotated in its chassis. Thus its constructor can set it for any time or position, and he can use it also for solving simple navigation problems. All that is needed to build up the astronome from the chart is a sheet of cardboard, a sharp knife with which to cut out the various parts, and adhesive tape.

"HOW TO MAKE A WORKING MODEL OIL ENGINE"

(Modelcraft Ltd., 77, Grosvenor Road, London S.W.1. Price 2/-)

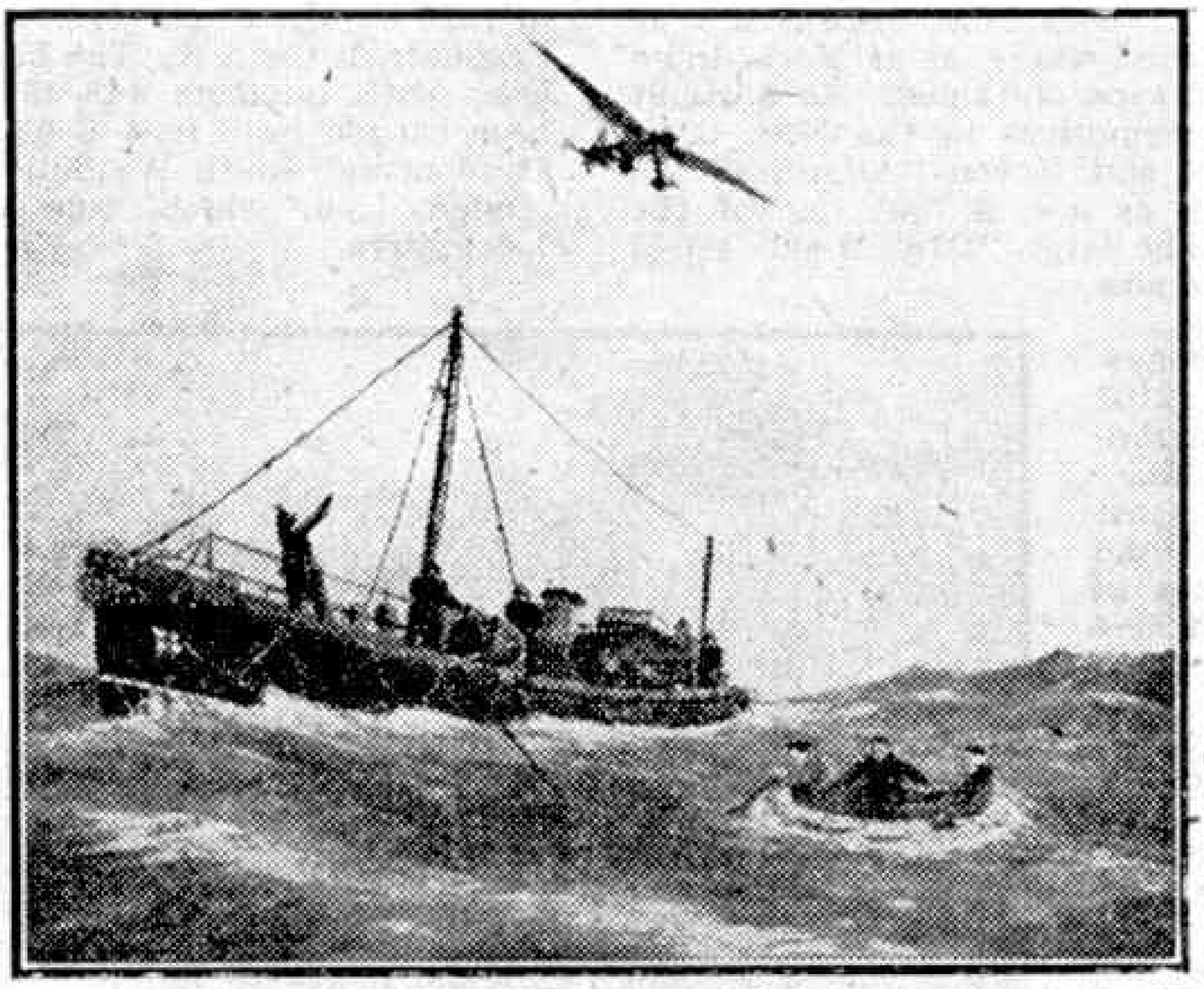
Model-builders who are having difficulty in obtaining supplies of metal or wooden parts will be greatly interested in the model described in this booklet, for it can be built up of materials that are readily available to anybody. These are chiefly brown paper, strawboard, odd bits of wood and glue, yet the model is realistic in appearance and actually works on air. It is designed for a pressure of 2 or 3 lb. per sq. in., which can be applied by means of a bicycle pump, a bellows, or even by simply blowing with the mouth, and a later "Modelcraft" plan book is promised with instructions for making a suitable foot or hand bellows. A kit of parts has been planned, but will not be available until after the war.

In spite of the apparently crude materials used the construction of the engine is real model-building.

The Life-boat Service and the War

IN the days of peace it was the fishing fleets that most often called upon our life-boats for help, and year after year from a quarter to a third of the launches of life-boats were to fishing boats. Since the war began the place of the fishing boat has been taken by the aeroplane, which certainly was never in the minds of Sir William Hillary, the founder of the life-boat service, and of those who were pioneers with him. This unexpected development is the most striking feature revealed in "*The Life-boat Service and the War*,"* published by the Royal National Life-boat Institution, which tells the story of the wonderful work that has been done by life-boatmen in 3½ years of conflict.

On the quietest nights of the war there are aeroplanes coming and going off the east and south coasts of Great Britain, and watchers must be on duty continually, listening for messages that will call the life-boats to the rescue. All stations have been specially prepared for this unexpected emergency of the war, and watchers keep their eyes wide open, knowing well that the tiniest specks seen out at sea may be airmen drifting in their dinghies. On one foggy morning the landlord of an inn on the sea front at Sheringham, in Norfolk, glanced out of his window when there came a glint of sunshine, and saw a tiny object on the sea a mile away. He immediately trained his telescope on the spot and discovered that it was a raft. This was the beginning of a rescue in which the life-boat took part, whereby six airmen whose machine had come down the night before in a raging gale were brought to safety after drifting for 17 hours, soaked, seasick and weary.



A 46-ft. Watson cabin life-boat, guided by a "Lysander," rescuing three airmen from their rubber dinghy. From a painting by Mr. L. F. Gilding, a member of the Royal National Life-boat Institution's staff.

The call may come at any time and in the booklet we can see how all is organised to meet it. The secretaries of the R.N.L.I. at Sheringham and elsewhere sleep with a telephone beside them. Immediately a watcher gives the alarm—and this is done where there is the slightest possibility of airmen being in danger—he rings up the life-boat men, or messengers who immediately run to call them, and summons help to launch the boat. He then rings up the ambulance, calls upon those living round about to get ready hot drinks and hot baths, notifies doctors, and generally makes complete preparation for the reception of the rescued men. In the meantime the life-boat under its coxswain's command puts out to sea, whatever the state of the weather, and the search goes on until the men have been found. Sometimes a launch of the R.A.F. joins in, the two services working together in splendid harmony.

The stories of rescues effected in this manner are thrilling in the extreme, and they illustrate the many dangers to which the rescuers are exposed. On one occasion a coastguard at Wells in Norfolk reported a flare about three miles out at sea. The night was dark and misty, but the life-boat immediately put out, and half way down the channel to the open sea it encountered the R.A.F. rescue launch. Speed is essential in rescue work, so the coxswain of the life-boat put two of his men on board the launch to pilot this out, as the R.A.F. men were uncertain of finding their way through the winding channel. Soon the launch neared the position where the flare had been seen. A message was flashed by lamp; there was an answering signal, and very soon six weary airmen were taken aboard from a rubber dinghy. It was the second time these men had been rescued from the sea; on the previous occasion they had drifted for three days and three nights before they were picked up.

All these stories have their thrills, but perhaps the most remarkable concerns an airman, shot down during the Battle of Britain, who was seen by a coastguard at Margate to go down into the sea by parachute. In the mist that was prevailing at the time it was nearly an hour before he was found, and it was then discovered that his clothing had caught fire and he was so badly burned that he was on the point of collapse. He was taken on board, bandaged and made as comfortable as possible, and when the shore was reached the waiting ambulance took him straight to hospital. This airman was Flt. Lt. Hillary, a descendant of the brother of Sir William Hillary, who in his wildest dreams could never have imagined that the Institution he founded could have helped one of his family in such strange circumstances. Flt. Lt. Hillary was later killed on active service when training as a night fighter after making a miraculous recovery from his burns.

Although the aeroplane has brought the life-boat service new problems, its greatest enemy is still its old friend the sea, and the wonderful story of rescues in storms and perils so often told in the "*M.M.*" is continued here. As an instance there is a remarkable rescue begun in the Bay of Peterhead, on the East coast of Scotland, one Friday morning, when the life-boat went out in a strong wind to bring in a steamer that had been in a collision, and two other steamers followed to seek shelter. The wind continued to rise until it was blowing a gale, with gusts at 105 m.p.h. and from then until Monday morning the life-boat crew stood by the three vessels, putting out three times, twice in blinding darkness and snow, and continued throughout in imminent peril of destruction on the rocks. The crew were soaked, numbed with the cold and exhausted for lack of sleep, but they carried on until they had saved 106 men.

**"The Life-boat Service and the War: Three and a Half Years." Royal National Life-boat Institution, Life-boat Depot, Borcham Wood, Herts. Price 1/-, post free.*

Railway News

L.N.E.R. Running News

For some time prior to the outbreak of war it was the custom to run an L.N.E.R. engine through from Sheffield to Swindon, traversing G.W.R. metals from Banbury every day on a through north to west express, returning by the same route through Oxford at night. This practice was revived recently as a Sunday working, out and home within one long day, and the duty has been shared by "Atlantics" of G.N. and G.C. varieties, "Green Arrows," "Directors" and "B3" G.C. 4–6–0s.

Former Great Central locomotives have been seen a good deal lately on the Grantham-Nottingham passenger services of the former G.N. line, including two classes of Robinson 4–4–2s and a "Director" 4–4–0.

New "Green Arrow" 2–6–2s Nos. 3676–9 are at Gateshead (Newcastle) shed where, as at York, there are many of the "V2" type stationed. As a result of a re-allocation of locomotives in the N.E. area, nearly all the Worsdell and Raven "Atlantics" are now stationed at Hull, as are all but one of the "B15" 2-cyl. 4–6–0s. The large "B16" 3-cyl. 4–6–0 mixed traffic engines are now all shedded at York.

N.E. "R" class 4–4–0, now L.N.E.R. "D20," No. 2101 worked the same Bridlington-Hull - Scarborough - Bridlington turn daily for at least two months. Both the "Mikado" goods engines of class "P1" numbered 2393–4 now have "A3 Pacific" boilers and cylinders.

The new 4–6–0 "*Springbok*," which we illustrated and described in the May issue, has been working Manchester - Marylebone passenger services. Occasionally, owing to one of the big modern 4–6–2 or 2–6–2 locomotives not being available on account of repair work or temporary failure, heavy expresses have been seen coming into King's Cross headed by two Ivatt "Atlantics" quite lately; these trains have included "*The Flying Scotsman*" the "*Aberdonian*," and the 2.7 p.m. Newcastle train.

No less than 15 different W.D. "Austerity" 2–8–0s of the new standard British design numbered 70xx and 730x have been reported working freight trains on the G.N. main line south of Peterborough. One was tested with apparent success with 60 loaded mineral wagons up, and 80 empty back, on the "express coal" schedule worked in peacetime by "K3" 2–6–0s, making the round trip from Peterborough to Ferme Park yard, four miles north of King's Cross, and back within 8 hrs., with only one or two stops in each direction.

The longest non-stop run on the L.N.E.R. is the 126¾-mile journey in each direction made daily by the first portion of "*The Flying Scotsman*" between Grantham and Darlington, passing York. This is operated by N.E. area men stationed at Newcastle (Heaton or Gateshead) on "Pacific" or "Green Arrow" engines, often with a load of 20 coaches weighing nearly 700 tons full. These trains are booked non-stop between Newcastle and Edinburgh, 124½ miles.

* * * *

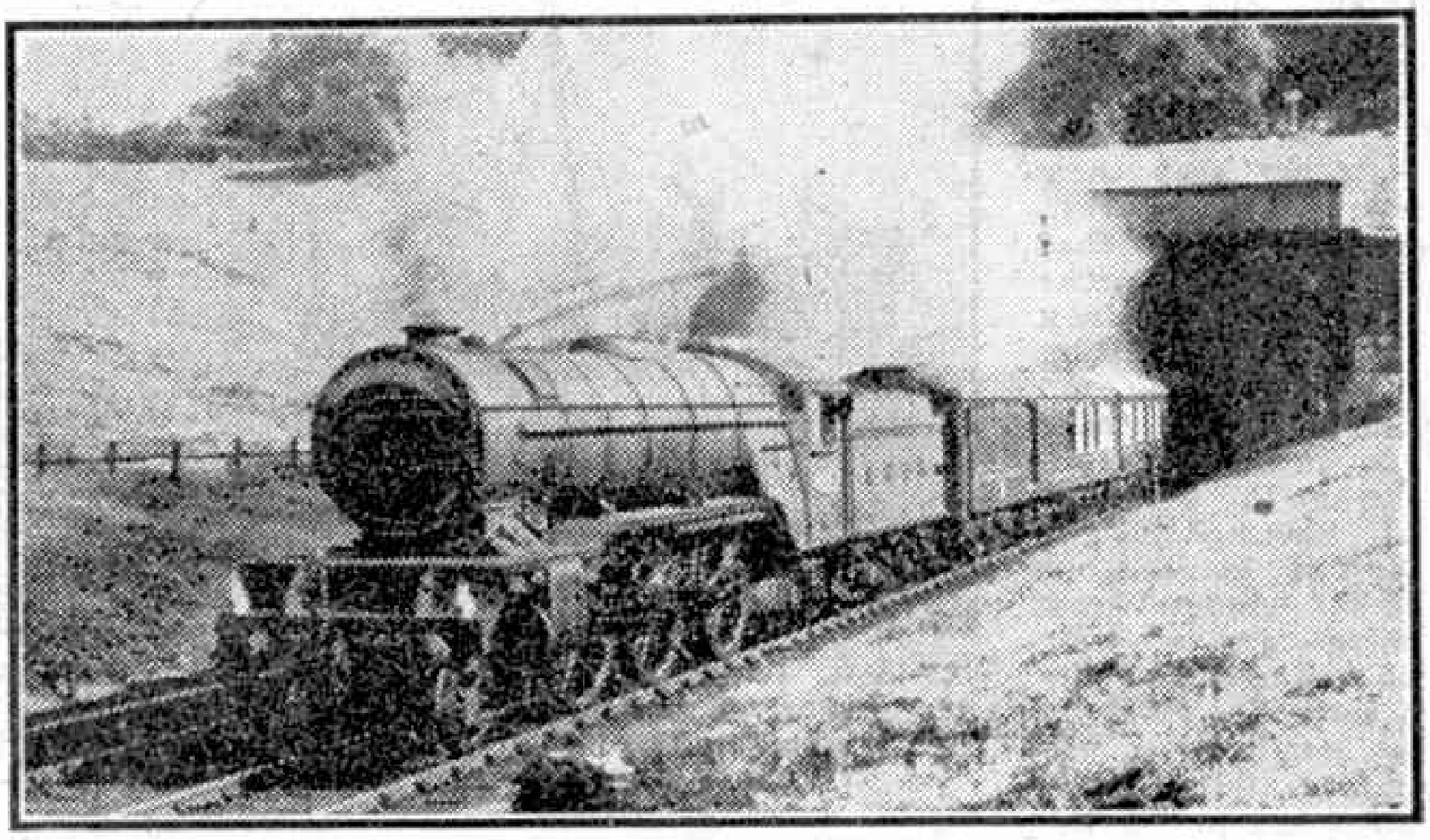
Non-stop runs of over 100 miles are made daily by 50 or more L.M.S. trains.

Increased Southern Express Loading

From the beginning of May on the quieter days of the week the principal morning expresses to and from Waterloo and Exeter were run in one train instead of being divided daily, as with "Pacific" haulage loads may be made up to 16 corridors, which may represent a total of 560 tons gross. Savings are thus effected in locomotive and man power as well as in fuel consumption and track occupation.

"King Arthurs" in Peace and War

As befits a famous class of express engine bearing the ancient names of the legendary Knights of the Round Table, "King Arthurs" are taking a valuable share in the working of passenger, special and freight trains over a wide area. The type was introduced in 1925 by Mr. R. E. Maunsell, then Chief Mechanical Engineer of the S.R. The first 10 were built at Eastleigh with numbers 448–457, which had previously been carried by 6 ft. 4–6–0s of an earlier Drummond London and South Western series, the eight-wheeled tenders from which were transferred to the new locomotive.



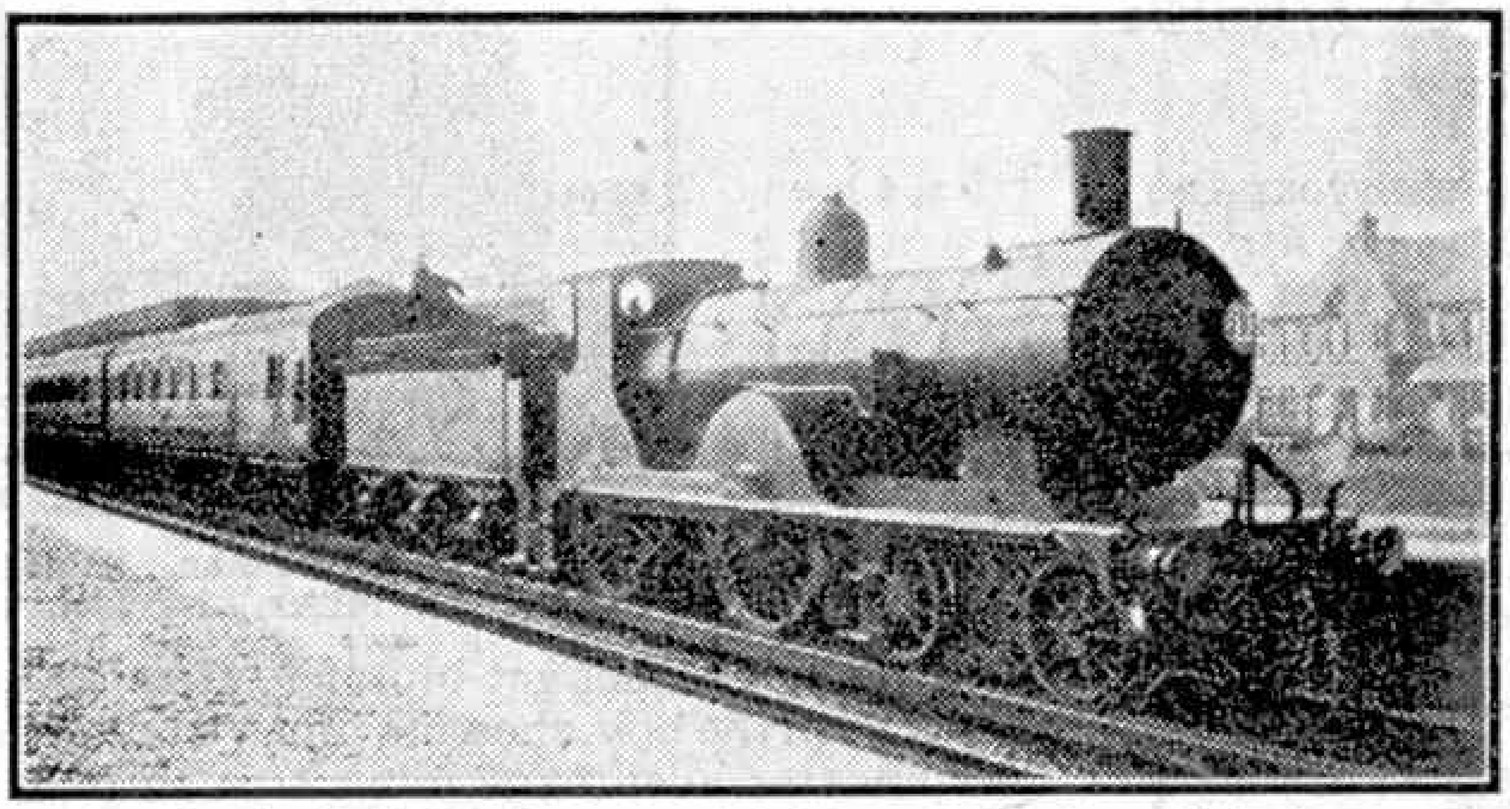
"Green Arrow" 2-6-2 No. 4817 hauling the "Yorkshire Pullman," with which a maximum of 93 m.p.h. was reached during a run in 1939. Photograph by C. L. Coles.

The principal dimensions of the "King Arthurs" are as follows. The driving wheels are of 6 ft. 7 in. diameter. The two outside cylinders are of 20½ in. diam. with 28 in. stroke, and have long-travel piston valves actuated by Walschaerts gear. The boiler pressure is 200 lb. per sq. in., the combined heating surface, including superheater, 2,215 sq. ft., and the total weight in working order 138 tons. The slightly tapered boiler, with round-topped fire-box, has a length of 13 ft. 9 in.

Later in 1925 30 more of these engines were built by the North British Locomotive Co. Ltd., and have proved exceedingly reliable engines. They are numbered 763–792 and are called "Scotchmen" on account of their origin. The last batch of 14, Nos. 793–806, were turned out from Eastleigh in 1926–7 with straight sided six-wheeled tenders, for service over the London-Brighton main line, on which they worked the principal express trains until the line was electrified in 1933. Then they were transferred to the "Kent Coast" services.

The 4–6–0s numbered 736–755, which are also type "N15" and now bear the words "King Arthur class" beneath their names, are actually of an older

L.S.W. Urie design dating from 1918. Originally they had stove-pipe chimneys. The boiler was similar but pressed only to 180 lb. per sq. in., and their cylinders were 1½ in. larger in diameter. Blast pipe, chimney, valve travel and steam pipes were all of smaller dimensions than on the much more successful "King Arthurs" proper, and modifications have been effected in some cases to bring the 736 series into line. All now have smoke deflectors at the side of the smoke-box.



A rebuilt "T9" Drummond 4-4-0 on a Portsmouth train.

Owing to their higher cabs of Urie pattern, Nos. 736–755 and 448–457 cannot run over the Central or Eastern Sections. The L.N.E.R. at present have 10 of the former series on loan. Another five have been fitted with multiple-jet blast pipes with large diameter chimneys, as has No. 792, the last of the "Scotchmen." Two of the fastest runs ever made on special occasions between Waterloo and Salisbury were achieved by No. 451 "*Sir Lamorak*" and No. 777 "*Sir Lamiel*" down and up respectively.

One of the modified Uries with double chimney gave a very good run this year with a relief semi-fast from the Salisbury line to Waterloo, weighing 430 tons. No. 741 "*Joyous Gard*" made a fast start over the favourable road from Basingstoke and was soon travelling in the high 60s. The minimum up the short rise to mile post 31 was 57 m.p.h., followed a few minutes later by a maximum of 69 before brakes were applied heralding the stop at Woking, which was achieved in 27 min. from Basingstoke, 23½ miles away, 3 min. under schedule. The sharp timing of 16 min. for the 12¼ miles on to Surbiton was also improved upon by 40 secs., again favoured by a downhill start. Between Walton-on-Thames and Hampton Court Junction 66 m.p.h. was averaged, so indicating once again that average speeds on the Western section of the S.R. have fallen remarkably little under war conditions.

A "T9" Rises to the Occasion

From time to time we have mentioned the "Drummond Greyhounds," the 40-year old 4–4–0 engines of class "T9" which created a fine reputation for speed and reliability in London and South Western days. Like various other contemporary British types, in their rebuilt superheated form, they are still capable of express work when the need arises.

When hauling a 355-ton Bournemouth-London semi-express, a "Lord Nelson" developed a defect at Micheldever and had to be assisted to Basingstoke. There she was replaced by the station pilot, "T9" No. 307, to which comparatively diminutive locomotive the Nine Elms, London, driver and fireman changed. The allowance to the next stop at Woking in this case was the peacetime one of 27 min. only. The start, and the maximum and minimum speeds, were slower than achieved by the 4–6–0 hauling 430 tons mentioned elsewhere, but with a rapid finish down from Brookwood only 1¼ min. were lost on that stage. After restarting with great vigour, the passing times as far as Weybridge were the same as No. 741's 5½ miles in 7¾ min. to Weybridge, but they fell behind a little on the nearly level track to Esher, where a severe signal check occurred. But for that delay Surbiton would have been reached in the quickest booked time of 16 min. for the 12¼ miles from Woking start; as it was, there was a slight gain on the 18 min. allowance given to that particular train. A little time was lost on the next short stage to Waterloo, but it was a splendid effort with a 355-ton train!

New British Ambulance Trains

Several hospital trains are being completed in the works of the British main line railways for use by either United States or British Forces at home or overseas. The rolling stock is being adapted from existing bogie vans and coaches of modern design.

Each complete train consists of 14 vehicles with accommodation comfortably and ingeniously arranged for 292 patients, in addition to medical officers, nurses, orderlies, cooks and fitters who live on the train.

Ward cars have berths for 36 stretcher cases each, loading and unloading being effected through large central doors. Exterior painting is in khaki shade with red crosses on a white background painted on each side, as well as on the roof of each coach.

Canadian Locomotive Bells

A bell is part of the front-end equipment of most Canadian locomotives. In order to conserve base metals the C.N.R. are making their locomotive bells of welded steel plate instead of the more costly and heavier bronze, and there is a saving of nearly 30 lb. in weight as well as considerable economy in cost.

* * * *

The world's record daily non-stop run is 299¼ miles, made between Carlisle and Euston by the L.M.S. 10.0 a.m. Glasgow to Euston train.

An unusually short passenger train on the Harpenden-Hemel Hempsted branch of the L.M.S. This is the normal length of the train. Photograph by W. S. Garth.

Photography

Snapshots of Friends

By A.R.P.S.

USUALLY at this time of the year the light, photographically, is at its strongest. Therefore, assuming that you are still using Selochrome films, you will have to use a small stop equivalent to F16, and give exposures of 1/100th between the hours of 11 and 4 o'clock on a bright day.

Recently I have had the opportunity of

"My word, you're getting heavy!" Photograph by J. G. Scott, Burnley.

examining a number of figure studies of friends taken by amateurs; the majority were very commonplace and I am sure would have been much more interesting if a little more thought had been given to the subject before the camera clicked, and if the person or persons were less "camera conscious." Let me give you one or two examples:

Two friends and a dog in your garden or outdoors. A very pleasing study could be made of these by asking one of the friends to stand looking at the dog while the other was stooping to pick up a ball or stick. The dog would be sure to be watching to see what was going to be done with the ball and would be ready to spring after it; all three would be interested and quite unconscious of what the camera was doing.

An Isle of Man Boatman. Photograph by E. Miller, Liverpool.

Father playing with a younger brother. Do not ask father to sit down with Johnny on his knee, but rather get him just when he is joking with the boy, showing him a trick with his hands or even explaining how to plant a cabbage or use a hammer—any position rather than just gazing at the camera. As a portrait you will not lose anything, for the expressions will be more natural.

In taking figure studies you must remember to measure the distance between the camera and the nearest member of the party and to make sure that this agrees with the distance scale on your camera if there is one. This is particularly necessary when taking "close-ups" of your chums; you can use the view-finder to make certain that you are not cutting off their heads or feet, but this will not ensure sharp focussing. If there is no scale measure 20 ft. and take the shot at that distance.

Some of you may be going on holidays and have not used the camera since Easter or last year. Before loading a new film into it, open the back and gently tap each side to remove any small particles or dust.

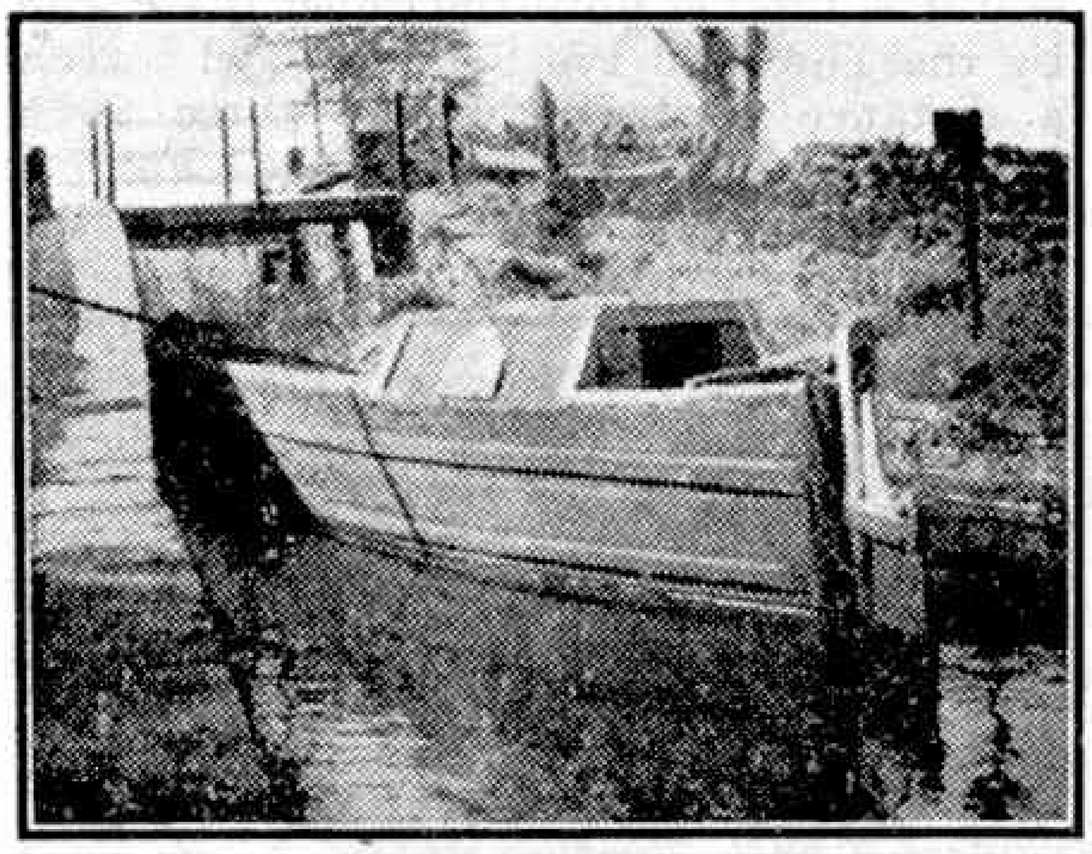
Fun at the Ford. Photograph by P. M. Chambers, Mansfield.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

AN ANCIENT WATERWAY

The Glamorganshire Canal, which connected the towns of Merthyr Tydfil and Cardiff, in South Wales, was begun in the year 1790, and in 1794 it was opened for traffic between Abercynon and Cardiff.



A barge entering a lock of the Glamorganshire Canal at Llandaff. Photograph by I. L. Wright, Cardiff.

Abercynon stands at the junction of the rivers Taff and Cynon, and was then known as Navigation. By 1798 the canal was completed between Cardiff and Merthyr, its total length being 26 miles. It was constructed to convey coal and iron from Merthyr to Cardiff for shipment at the Docks there. Merthyr at that time possessed many extensive iron works, including the famous Penydarran Works where the first locomotive, Trevithick's high pressure steam tram engine, was employed, and prior to the completion of the canal iron and coal were brought to Cardiff on the backs of pack horses along rough tracks.

The canal engineers overcame great geographical difficulties in constructing the waterway. It was necessary to negotiate enormous differences in height and to follow tortuous routes hugging the mountain sides, in some places 300 ft. above the river Taff. In its course of 26 miles the canal had 51 locks, and at Merthyr rose to a height of between 500 ft. and 600 ft. above sea level. In one section between Abercynon and Quaker's Yard it had 11 locks within a length of only ¼ mile, giving a rise of 200 ft.

The canal was responsible for the acceleration of the iron industry at Merthyr, and the phenomenal growth of Cardiff as a modern port. By the seventies, however, traffic began rapidly to decline as railway competition made itself felt; and moreover, the canal's mainstay, the ironworks at Merthyr, had begun to close down when local supplies of ore became exhausted. Accordingly some few years later traffic ceased on the Merthyr-Pontypridd section. The traffic on the remaining Pontypridd-Cardiff section, which had dwindled into insignificance, was brought to an end in 1942 by floods, which caused landslides at Nantgarw and Upper Boat. IAN L. WRIGHT (Cardiff).

RELICS OF THE "COMET"

The lower illustration on this page shows what is said to be a wheel from Henry Bell's "*Comet*," the first steam-driven passenger vessel to maintain a service in Europe. Along with it is an anvil, also owned and used by this pioneer. They are at Helensburgh, on the Clyde, where Bell lived for many years.

Bell began his experiments in Glasgow in 1791, and the "*Comet*" was launched in 1812. It plied between Glasgow and Greenock, and apparently caused great perturbation among the boatmen of the Clyde. One of them is said to have told his crew when they encountered the new vessel: "Kneel down and thank God that ye sail wi' the A'michty's ain win', an' no' wi' the deevil's sulfire and brimstane."

R. HOBBS (Glasgow).

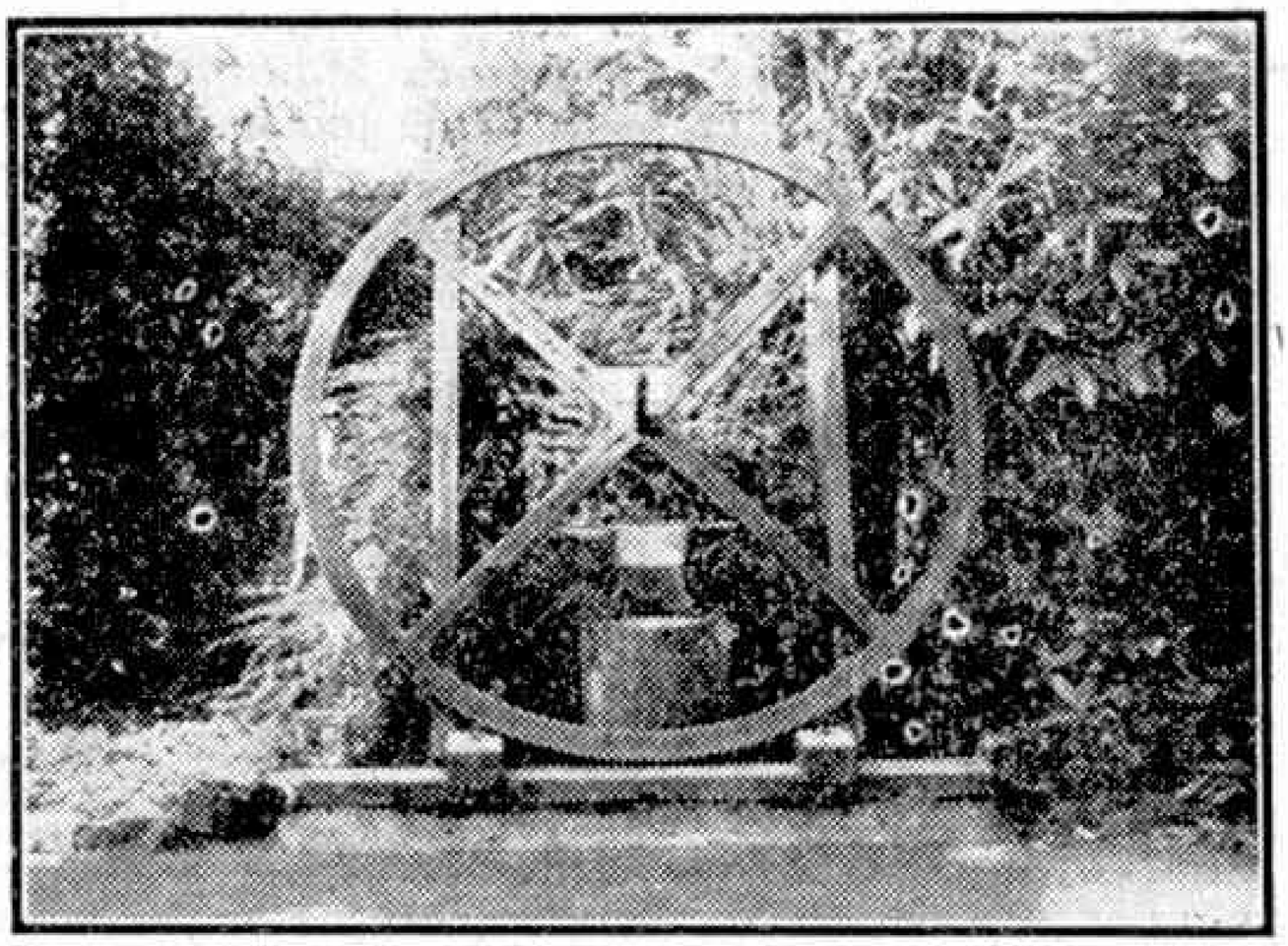
THE CLOCK AT WELLS CATHEDRAL

Last April I decided to visit Wells Cathedral. It was just before noon when I arrived in the North Transept and I saw several people waiting to hear the clock strike.

The clock is mentioned in documents dated 1392. The dial is 6 ft. 4½ in. in diameter and is contained in a square frame, in the corners of which are representations of angels holding the Four Winds. There are three circles on the clock face. The outer one is divided into 24 equal parts to represent the hours of the day, with the numbers printed in Old English. A large gilt star points to the hour. The middle circle shows the minutes, and a small star moves round the circle once each hour. The third circle gives the days of the lunar month, and a crescent with a pointer shows the Moon's age.

Within the third circle is a copper plate, pointed with stars and clouds to represent the world. Above the dial plate is a tower, around which knights on horseback revolve each hour on the striking of the clock.

D. A. GILCHRIST (Barnt Green).



Relics of Bell, the pioneer of the steamboat. They are to be seen at Helensburgh, on the Clyde, to which Bell's "Comet" ran. Photograph by R. Hobbs, Glasgow.

Suggestions Section

By "Spanner"

(605) Demonstration Model Automatic Telephone

(A. Hodgson, York)

The dial of the demonstration model automatic telephone shown in Fig. 605 is represented by a Fan mounted on the front end of a Rod that carries a Bush Wheel 1 and a Crank 2. The Bush Wheel is fitted with a Spring mounted on a ½" 6 B.A. Bolt, which also fixes to the Bush Wheel an Angle Bracket 3. The Angle Bracket must be electrically insulated from the Bush Wheel. When the dial is rotated the Angle Bracket moves off a Pendulum Connection that is attached to, but insulated from, an Angle Bracket bolted to the front Plate, and which makes contact with a second Pendulum Connection that is similarly attached to the front Plate. These Pendulum Connections are connected by the leads 4 so as to short circuit the transmitter and receiver.

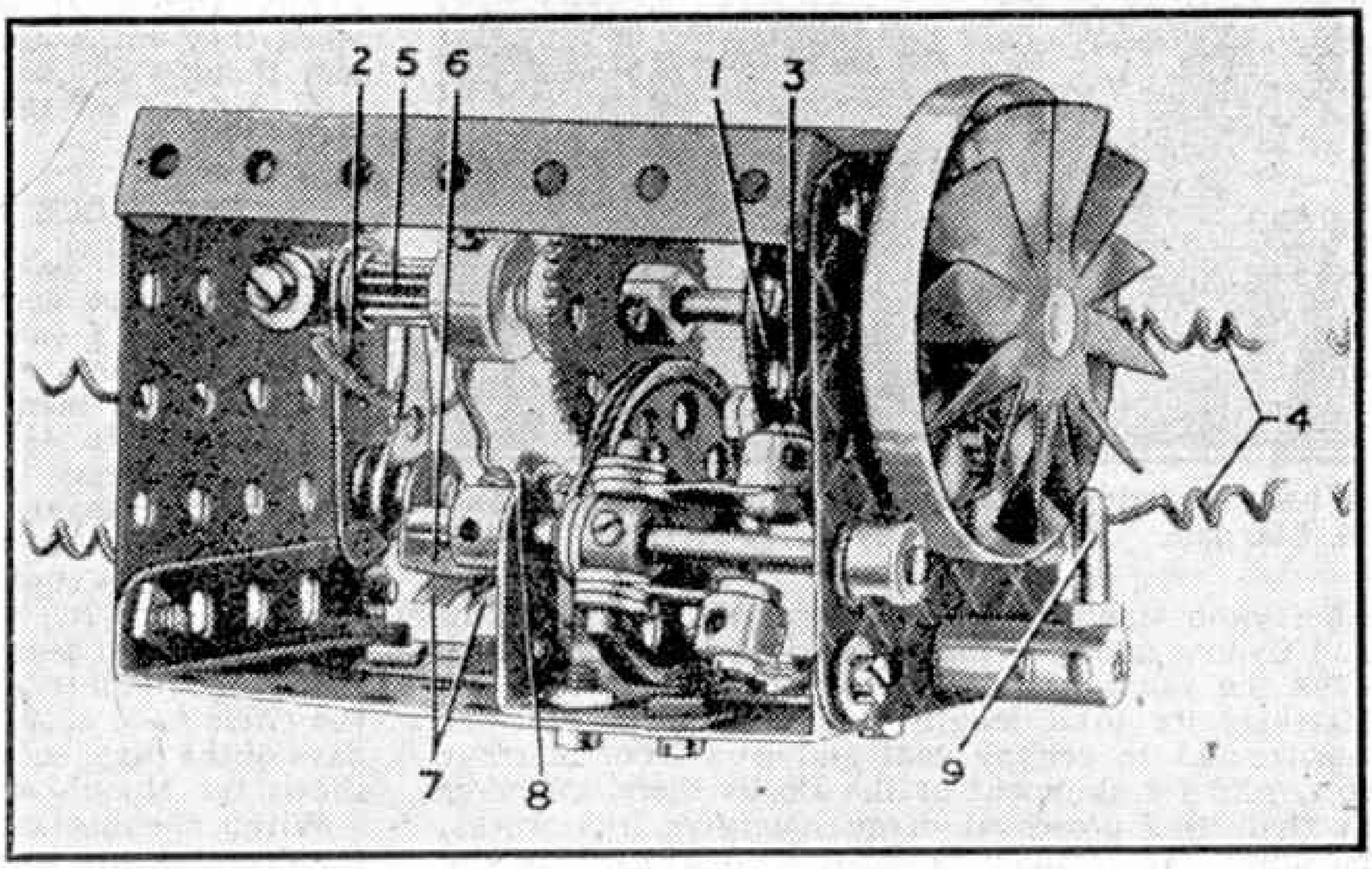


Fig. 605.

The Crank is fitted with a Pawl without boss, which is connected to it by a short length of Spring Cord so that it engages the teeth of either a No. 1A or a No. 2 Clockwork Motor Pinion 5, which has 12 teeth. The pinion is inserted in a Socket Coupling to which also is attached a 57-teeth Gear, the whole unit being mounted freely on the Rod. An Angle Bracket 6 also attached to the Crank makes contact with one of two Pendulum Connections 7, which are secured to a ½" Reversed Angle Bracket, but insulated from it. The other Pendulum Connection contacts the impulsing cam formed from four 7/32" Grub Screws inserted in a spider 8 on a 1½" Rod that carries a ½" Pinion meshed with the 57-teeth Gear. The ratio provides the number of contacts or impulses for the number dialled on the finger plate. The drive from this shaft is led to the governor shaft through a 1½" Pulley mounted on it, which is connected by a 2½" Driving Band to that shaft. The governor consists of a "spider" to which are attached two portions of Pendulum Connections. The weights are Collars.

The mechanism operates as follows. When dialling the number 1, the finger is inserted between two vanes of the Fan and it is rotated until the finger is stopped by the Threaded Pin 9. The Pawl travels a distance corresponding to three teeth of the Pinion, and when the Fan is allowed to return under the action of the spring attached to the Bush Wheel one of the Grub Screws in the spider 8 contacts the Pendulum Connections 7. The other two Grub Screws, which normally would make contact, are prevented from doing so by the Angle Bracket 6 attached to the Crank. Thus, when dialling 1 only one contact is made, and for every other number there are the corresponding number of impulses to the Pendulum Connections 7. In an actual automatic telephone these would be passed on to the selector mechanism at the exchange.

(606) A Further Use for the Meccano Washer ("Spanner")

Many model-builders are familiar with the use of the Meccano Washer in conjunction with parts that are to be bolted by their slotted holes, but owners of small Outfits in particular should bear in mind that a Bolt fixing such a part as a Flat Bracket or a Slotted Strip by its slot should be fitted with a Washer on its shank immediately under the head. This allows easy adjustment of the part and when the Bolt is tightened a secure attachment is ensured.

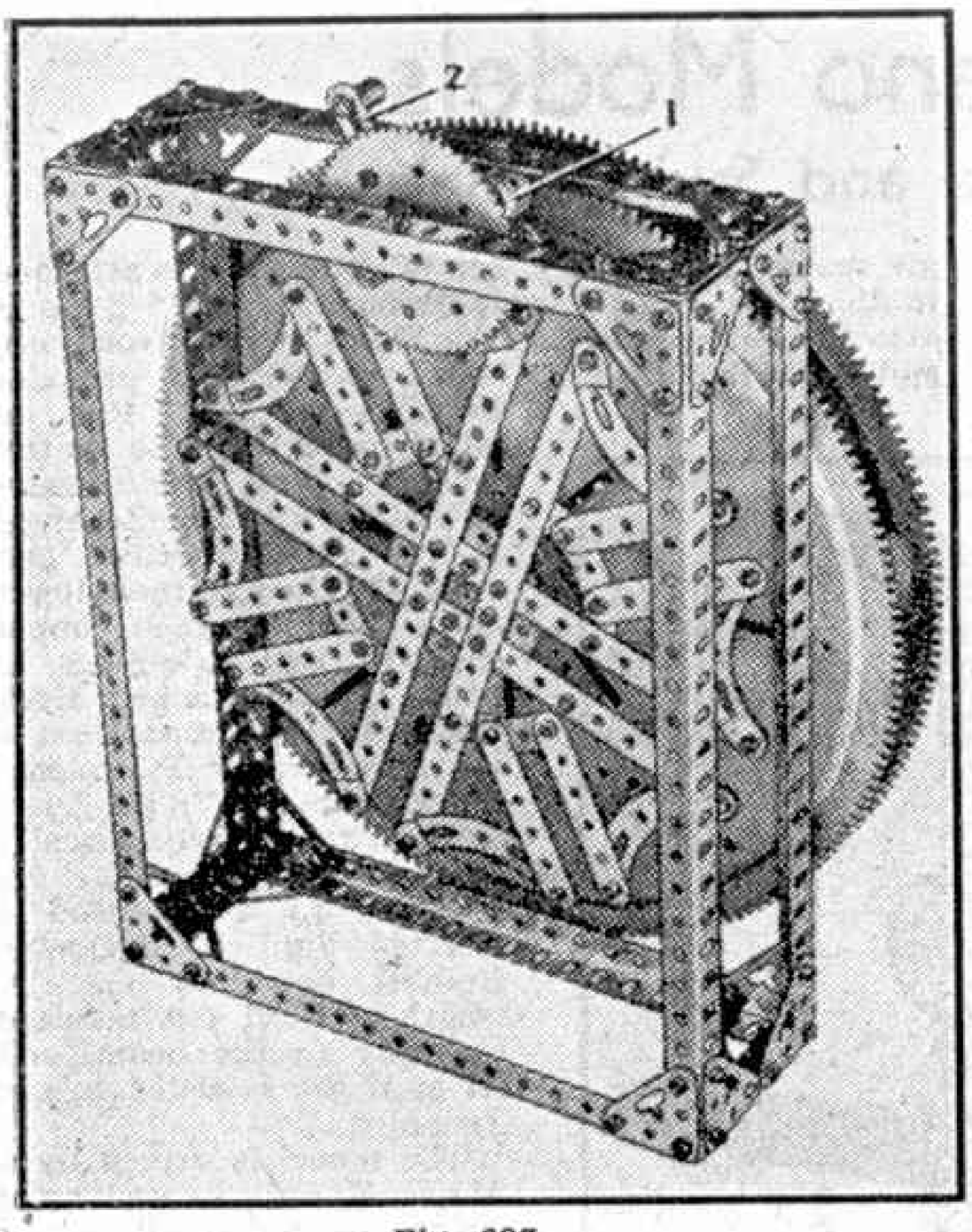


Fig. 607.

(607) Large Maltese Cross Mechanism
("Spanner")

Fig. 607 shows a large Maltese Cross mechanism that will be found useful in self-locking or intermittent motion mechanisms, and in machines of the kind where a rotating table is required to move intermittently. Machines of this type include paint spraying plants and bag filling devices where a definite quantity of material has to be discharged into each receptacle as it is carried by the table under the loading chutes.

In the mechanism shown in Fig. 607 the Cross is formed from Strips and Curved Strips. Four 9½" Strips are bolted in pairs at right angles to each other to a Face Plate, and those of each adjacent pair are connected by a 2½" Cranked Curved Strip. 3" Strips bolted to the 2½" Cranked Curved Strips are fitted at their outer ends with 3" Cranked Curved Strips bolted to the 9½" Strips.

The driving member of the mechanism consists of a Face Plate, to the outer rim of which are fitted five Chimney Adaptors 1. The arm consists of a 2" Slotted Strip 2 bolted to a 3" Sprocket, but spaced from it by four Washers equidistant from the end Chimney Adaptors. A Threaded Boss spaced by a Collar is fixed in the slot of the Slotted Strip by means of a 1" Screwed Rod, and must be adjusted so that it engages the slots in the Maltese Cross.

When the 3" Sprocket is driven the arm engages a slot in the Maltese Cross and rotates the Cross through the angle of one segment. Immediately the arm disengages with the slot the Chimney Adaptors contact the 3" Cranked Curved Strip of the following segment and lock the mechanism until the arm comes into position again to enter the next slot.

(608) Brake Mechanism for Trailer Vehicles
("Spanner")

Fig. 608 shows a method by which the brakes of a trailer vehicle are automatically applied when those of the hauling vehicle are applied. The device consists essentially of a Rod 1 to the end of which is attached the arm 2 that is fitted on the connecting pin on the rear end of the vehicle. The Rod is spring-loaded so that it moves against the action of a Compression Spring when it is forced either backwards or forwards. The Rod, 2½" in length, is suitably mounted on the front end of the trailer, as shown in the illustration, and a Collar 3 that presses against a Compression Spring mounted at either side of it is pivotally attached, so that it is not allowed to rotate, to two connecting links 4 formed from 2" Slotted Strips lock-nutted to the channel girder on which the mechanism is mounted and fitted at their lower ends with 1½" Strips lock-nutted to a Double Bracket. A Single Bent Strip bolted to the Double Bracket is fitted with a ½" loose Pulley lock-nutted to the outer ends of its arms, and this Pulley carries a cable attached to levers operating the brakes.

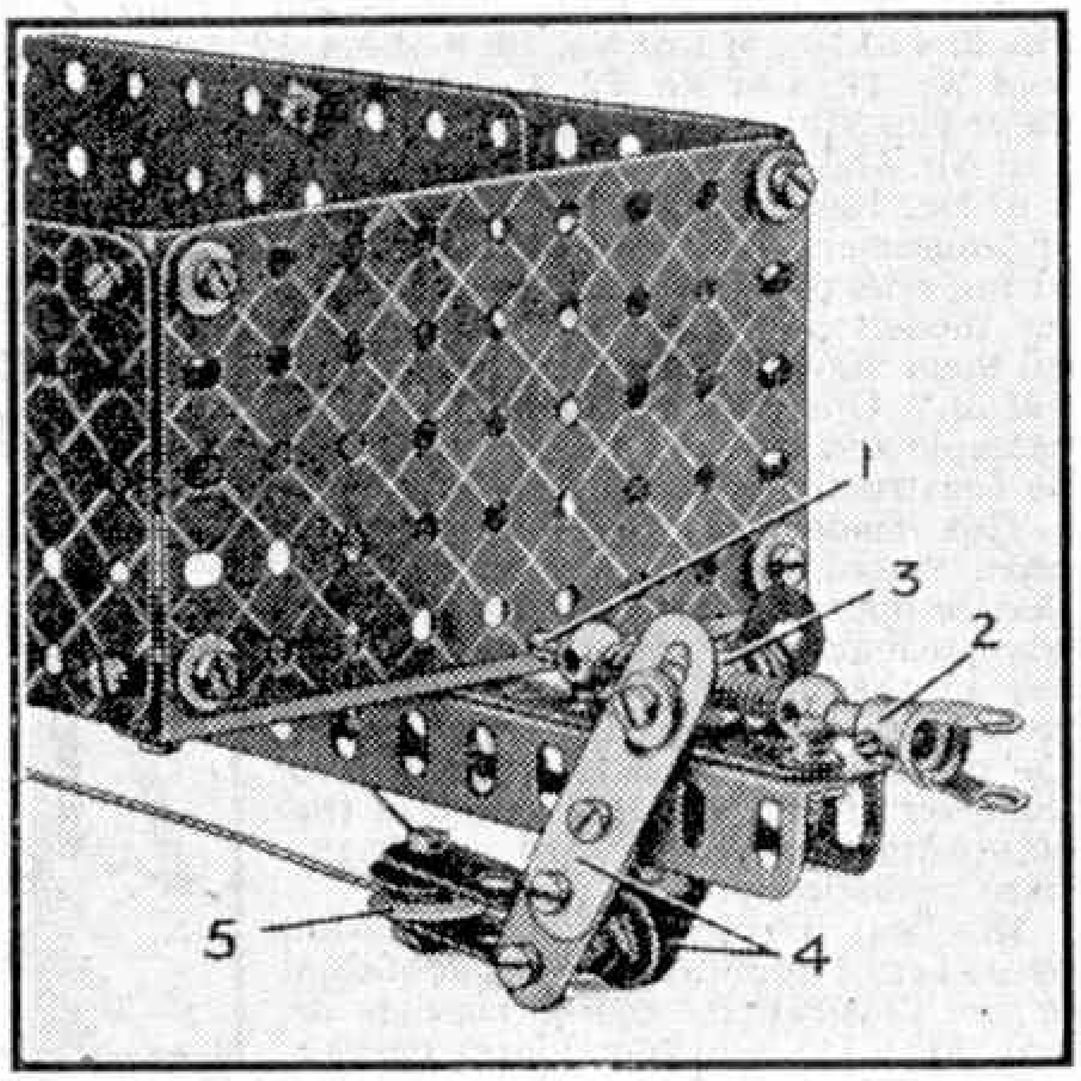


Fig. 608.

New Meccano Models

Light Mobile Crane and Swing Boat

OUR first model this month is the light mobile crane illustrated in Fig. 1. It is designed so that it can be constructed entirely from the parts in Outfit No. 1, and is of the three-wheeled type. The front pair of wheels is mounted on a 3½" Rod journalled in a 2½" × ½" Double Angle Strip 1 lock-nutted to a ½" Reversed Angle Bracket bolted to ½" × ½" Angle Brackets. The side-members of the chassis, 5½" Strips 2, are bolted to these Angle Brackets and also to further Angle Brackets at their rear ends. These Strips provide bearings for a 2" Rod on which the single rear wheel is mounted. The jib is mounted on a vertical pillar built from 5½" Strips, which are attached to the chassis and braced by Flat Trunnions. The upper ends of the Strips are lock-nutted to the jib in the positions shown, the jib itself being constructed from four 2½" Strips joined in pairs by ½" × ½" Angle Brackets as shown.

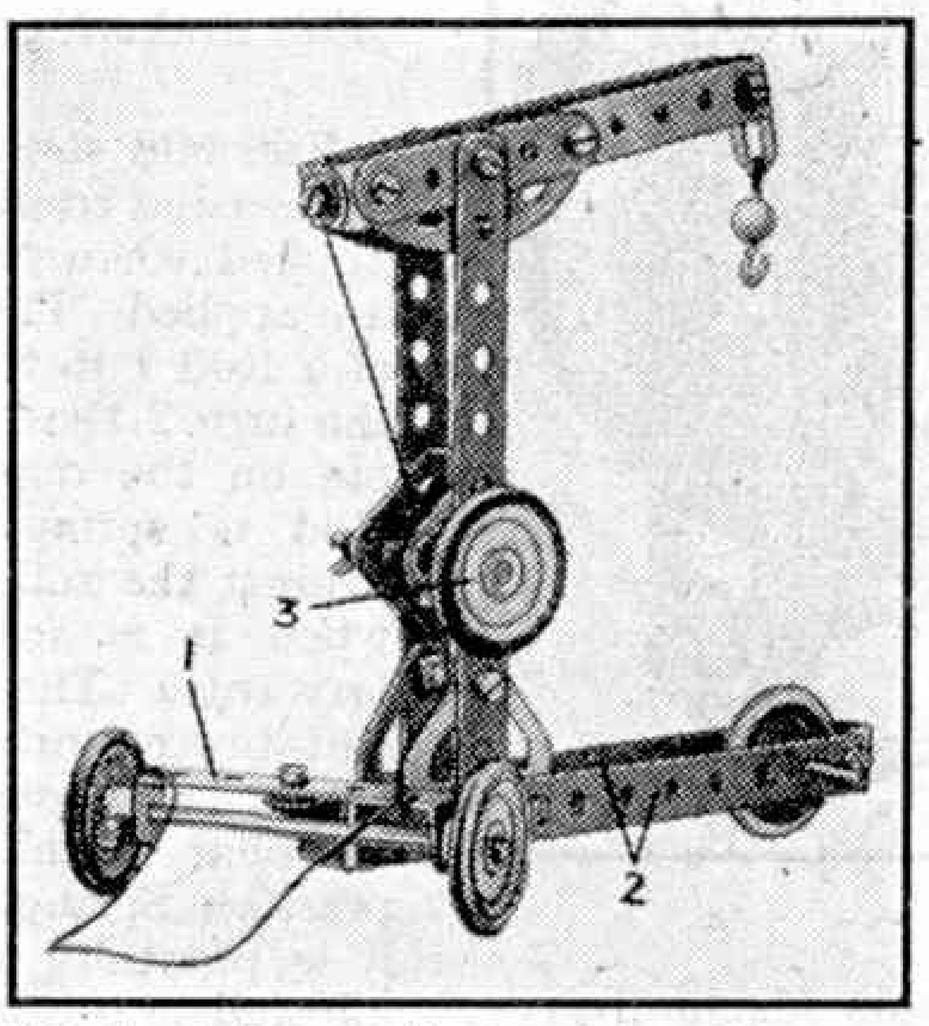


Fig. 1. A fine working model mobile crane built from parts contained in Outfit No. 1.

The jib is raised and lowered by operating a 1" Pulley 3 fitted with a Rubber Ring, which is mounted on a 2" Rod. The Rod forms the winding drum and is journalled in Trunnions bolted to the vertical pillar. A short length of Cord is tied to the Rods and its other end is attached to the inner end of the jib. A simple free wheel mechanism is fitted to the Rod to prevent it from unwinding when a load is placed on the Hook. This consists of a Spring Clip bolted by a ⅜" Bolt to one of the Trunnions and inclined at such an angle that one of its lugs allows the lugs of a Spring Clip on the drum to rotate when the load is being raised, but prevents the lugs from any reverse movement when the handwheel is released.

Parts required to build model light Crane: 4 of No. 2; 4 of No. 5; 1 of No. 10; 8 of No. 12; 1 of No. 16; 2 of No. 17; 4 of No. 22; 4 of No. 35; 30 of No. 37a; 23 of No. 37b; 4 of No. 38; 1 of No. 40; 1 of No. 48a; 1 of No. 57c; 2 of No. 90a; 3 of No. 111c; 1 of No. 125; 2 of No. 126; 2 of No. 126a; 4 of No. 155a.

Amusement devices of the kinds seen at fun fairs provide interesting subjects for models and many different types of them have been described in the "*M.M.*" Our second model is a further example and is shown in Fig. 2. It can be constructed from Outfit No. 3.

This model is a two-seater swing boat, based on an actual machine that is operated by those enjoying it, who push and pull with hands and feet, but in the model the boat is swung to and fro by an exterior mechanism, the drive from which is connected to the lever of the boat and so causes the occupants to move forward and backward realistically.

The boat is suspended from a beam by means of duplicated cords, as shown in the illustration, and it consists of two 5½" × 1½" Flexible Plates curved round and bolted at each end to 2½" × 1½" Flexible Plates. The Plates are spaced apart by 2½" Semi-Circular Plates attached to them by ½" × ½" Angle Brackets. A 2½" Strip is attached to the Semi-Circular Plates by Flat Trunnions, and a Double Bracket bolted to the Strip provides bearings for a 2" Rod on which is pivoted the central lever 1. This lever consists of two 2½" × ½" Double Angle Strips bolted together and to a 1¼" Disc at their lower ends, and at their upper ends to two Trunnions 2, and a Double Bracket. Each passenger is formed from a U-section Curved Plate lock-nutted by a ½" × ½" Angle Bracket to the Semi-Circular Plates. Their arms are attached to a 1½" Rod 3 inserted in the Double Bracket on the lever. A length of Cord 4 is fastened centrally to the beam, and its ends are fastened to the Trunnions.

The model is driven by a *Magic* Motor, the pulley of which is connected by a Driving Band to a 1" Pulley mounted on a 3½" Rod 5 journalled in the supports. The Rod is connected by a 2½" Driving Band to a ½" fixed Pulley on a 2" Rod journalled in the Flanged Plate and a Flat Bracket bolted to the Motor sideplate. The Rod carries at its upper end a Bush Wheel 6, to which is bolted a 2½" Cranked Curved Strip carrying a ½" loose Pulley held between two ¾" Discs. A piece of Cord is tied at one end into a loop that fits loosely around the Pulley, and its other end is fastened to the boat so that the crank mechanism causes the boat to swing to and fro.

Parts required to build model Swing Boat: 2 of No. 1; 6 of No. 2; 9 of No. 5; 5 of No. 10; 2 of No. 11; 8 of No. 12; 2 of No. 16; 2 of No. 17; 1 of No. 18a; 4 of No. 22; 1 of No. 23; 1 of No. 24; 6 of No. 35; 56 of No. 37a; 47 of No. 37b; 6 of No. 38; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 3 of No. 90a; 3 of No. 111c; 2 of No. 125; 2 of No. 126; 2 of No. 126a; 2 of No. 155a; 1 of No. 176; 1 of No. 186; 2 of No. 188; 2 of No. 189; 2 of No. 199; 2 of No. 214; 4 of No. 215; 1 of No. 217a; 2 of No. 217b; 1 *Magic* Motor (not included in Outfit).

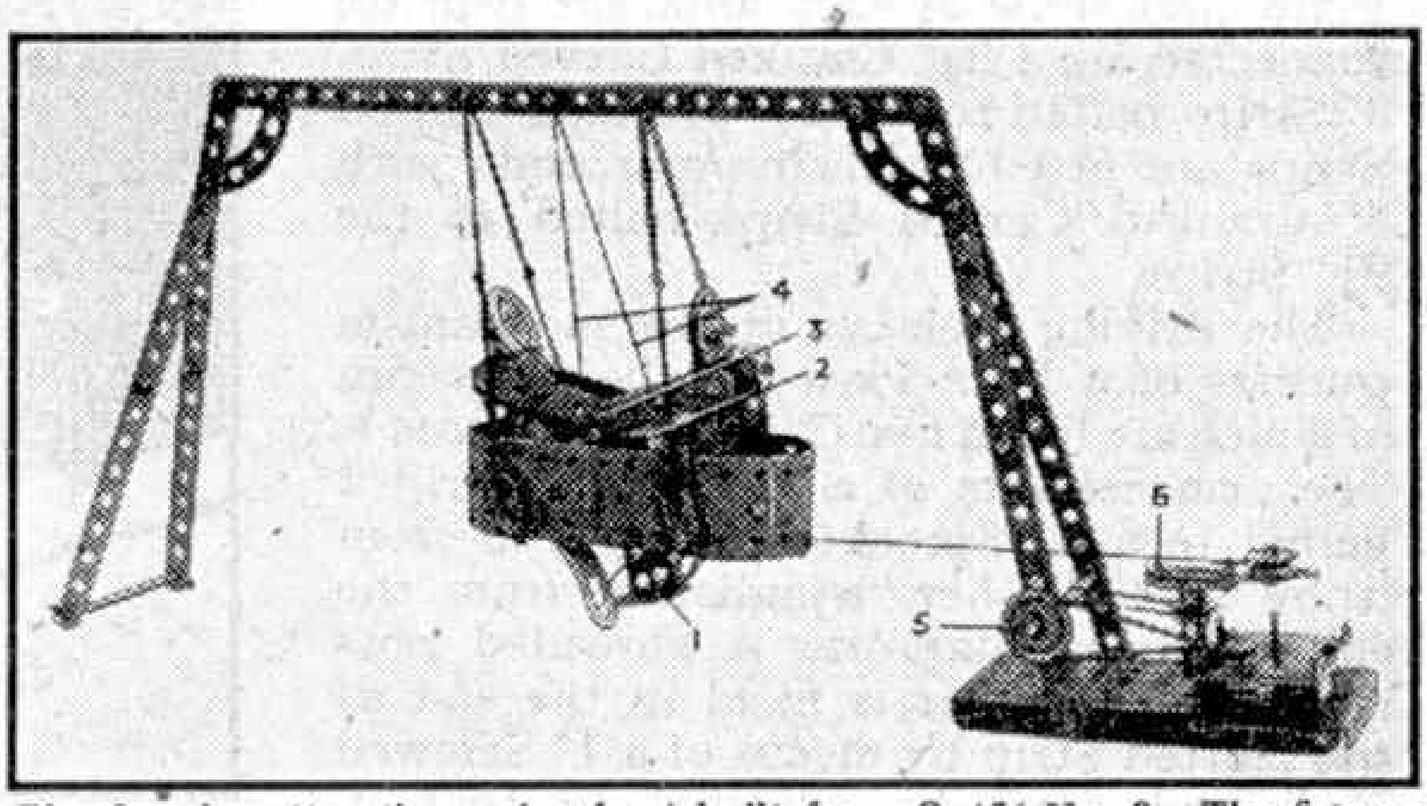


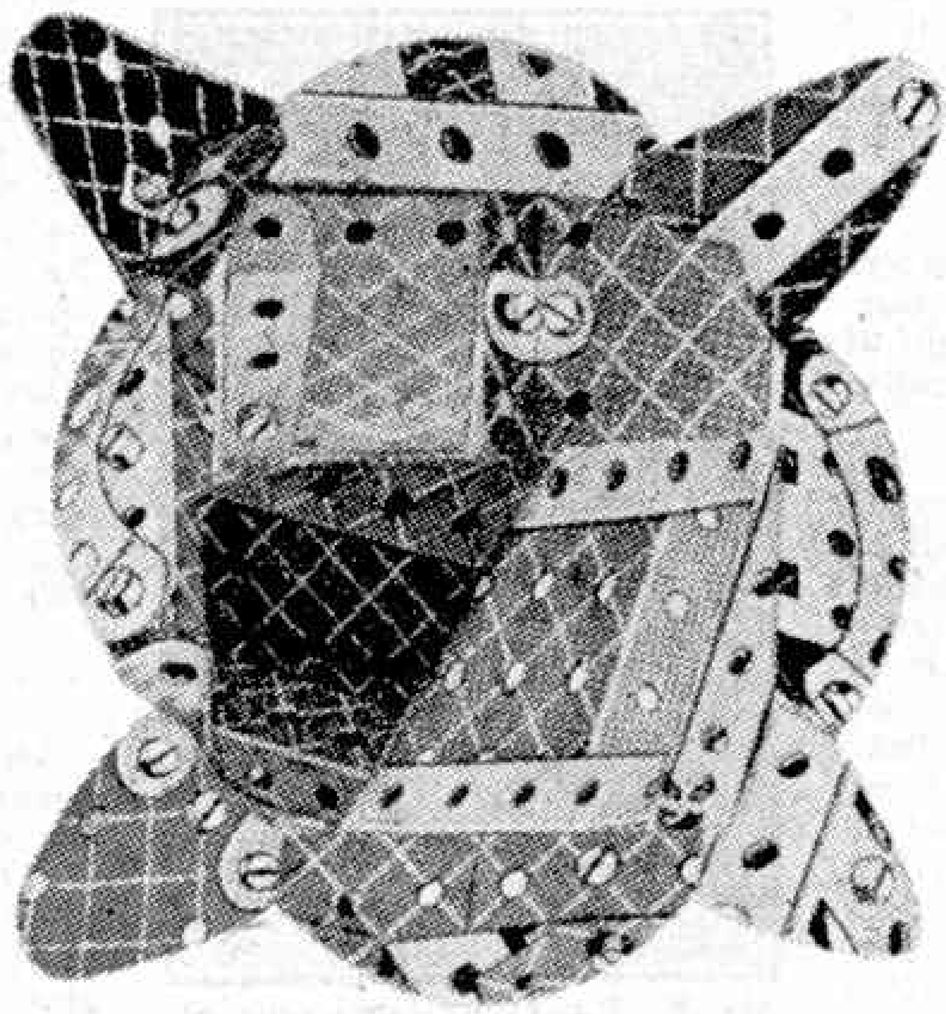
Fig. 2. An attractive swing boat built from Outfit No. 3. The figures in the boat move realistically.

Meccano Model-Building Competitions

By "Spanner"

A Summer "Sharp Eyes" Contest

This month we give details of a new "Sharp Eyes" Contest, in which every Meccano enthusiast has a splendid chance of winning one of the principal prizes. There is no model-building to do, and all that a competitor requires to prepare his entry is a copy of the Meccano Instructions Manual for Outfit Nos. 0–3, a pencil and a postcard.



The star-shaped design that appears on this page is made up of pieces cut from illustrations of models in the Meccano Instruction Manuals for Outfit Nos. 0, 1, 2 and 3. Readers are asked to write down, on a postcard, the Manual numbers and the names of the models concerned.

On careful inspection of the illustration competitors will soon be able to "spot" the sources of a number of the fragments that have been used. The actual Meccano parts and the way in which they are arranged in the various pieces will help considerably in solving their identity.

It should be noted that the fragments are not necessarily printed here in the same positions as they are to be found in the Manual. Some may be upside down, and others sideways.

The competition is open to readers of all ages and is divided into two Sections, "A" for competitors in the British Isles and "B" for Overseas competitors. It should be noted that each competitor is allowed one attempt only. The prizes to be awarded in each Section are as follows: First, Cheque for £2/2/–; Second, Cheque for £1/1/–; Third, Postal Order for 10/6. There will also be five consolation prizes of 5/– in each Section. Closing dates: Home Section, 31st August; Overseas Section, 27th February 1944. Entries must be addressed: *"Sharp Eyes Contest, Meccano Ltd., Binns Road, Liverpool 13."*

More "New Year" Results

Last month we described the outstanding entries in Section A of our "New Year" Contest. The following is the list of prize-winners in Section B of this "New Year" Contest competition.

1st Prize, Cheque for £2/2/–: A. Short, Birmingham; 2nd, Cheque for £1/1/–: M. Davies, Harrow; 3rd, Postal Order for 10/6: K. Knight, Lindfield. Postal Orders for 5/–: C. Bailey, Dorchester; J. Jennings, Newport; W. Ashby, Astley; M. Gradidge, Langley; R. Slater, S. Shields.

A. Short was awarded First Prize for a selection of models, of which a miniature testing machine was outstanding. This has a wide range, for it will bend Meccano Strips in addition to tearing paper and crushing biscuits and similar materials. It is driven by a No. 1 Clockwork Motor, which operates a balanced beam, fitted with a controlled movable counterweight, through a reversing gear, clutch and screw-operated raising and lowering mechanism. The load applied can actually be measured, and very little of the detail of the prototype has been excluded from the model.

Second Prize was presented to M. Davies for a model wool-winder. Various kinds of movements have been devised from time to time by model-builders to do away with the tiresome job of winding skeins of wool into balls, but these are seldom really practicable, as they are usually too complicated to work satisfactorily. The model submitted by M. Davies is simple enough. The skein is placed on four loaded arms mounted on a ball bearing unit and the wool is wound on an axle from which the ball can easily be removed after completing the operation. A guide to facilitate even winding is included in the device.

A simple model tricycle was the subject chosen by K. Knight, winner of the Third Prize. Although this has no outstandingly novel feature it is well proportioned and it can be seen that its designer has striven to shape the model strictly on the lines of its prototype, notably in the steering arrangements and the chain drive from the pedal to the rear axle.

The usual popular subjects for model-building were predominant among the entries of Consolation Prize-winners, but one in particular is worthy of mention. This is a model flour-mixing machine submitted by R. Slater. This is driven by hand, and in it the flour and other ingredients are placed in a receptacle which is rotated eccentrically round a fixed arm.

A small model field gun submitted by M. Gradidge, who was also awarded a Consolation Prize, is rigidly constructed from Angle Girders. Architraves provide very efficient means of attaching the front armour plating to the chassis. The gun can be elevated or dipped quickly and smoothly, and incorporates an efficient firing mechanism, which releases a spring-loaded Collar that in turn ejects a similar part forming the projectile.

Club and Branch News

WITH THE SECRETARY

CLUB REPORTS

I should like to emphasise the necessity for sending in Club reports in good time. Owing to paper shortage, and the consequent reduction in the size of the Magazine, the space available for reports in each issue is very much reduced. This means that I cannot always reproduce the outstanding features of all Club reports sent me, but I try to give each Club a turn, and I cannot do this unless reports reach me. It may be a little disappointing to send in reports that are not used immediately in the Magazine, but a little reflection will show what the reason is and also will remind secretaries and other officials that reports have another purpose in mind—that of keeping Headquarters informed and giving me the opportunity of making suggestions, and of assisting and encouraging generally.

SUMMER VISITS

This is a good time of the year for visits to works, of mechanical or railway interest, and Leaders should take every opportunity of arranging items of this kind. A little care is necessary in making a choice of works to visit. Obviously firms that are engaged on munition work of any kind should not be approached at all, but there are plenty of other works that can well be visited.

Many visits of this kind are arranged through friends of the Club, and in other cases it is advisable to write asking for permission, and to state the number of the party and to ask when would be the most suitable time. Whatever arrangements are then made should be very strictly kept, particularly in regard to the number of visitors, for it may cause some inconvenience if a larger party turns up than is expected. Care should be taken throughout that members of the party keep well together, following on their guide, and the visit should not end without an official expression of thanks and appreciation on the part of the Leader. Such courtesies help to give a Club a good name and pave the way to further visits.

Mr. G. Dewhurst is Leader of the Grasmere M.C. This Club was affiliated in October 1942 and now has a membership of 18. Model-building is the chief pursuit, and the Club also has a Library and its own radio set. Cycling is a favourite pursuit of members, who have done excellent work in salvaging paper in the district.

PROPOSED CLUBS

TWICKENHAM—Mr. M. Ratcliffe, 26, Katherine Road, Twickenham, Middlesex.

CONWAY—Mr. D. R. Williams, "Edadave," 46, Penmaen Road, Morfa, Conway.

BURY ST. EDMUNDS—Mr. D. M. Lucas, King Edward VI School, Bury St. Edmunds, Suffolk.

BELFAST—Mr. D. A. C. Smyth, 173, Castlereagh Road, Belfast, Northern Ireland.

PROPOSED BRANCHES

CARDIFF—Mr. J. G. Davies, 463, Caerphilly Road, Whitchurch, Cardiff.

WEALDSTONE—Mr. A. Godfrey, 50, The Broadway, Wealdstone, Harrow, Middlesex.

CHESTERFIELD—Mr. P. Slack, 22, Gladstone Road, Chesterfield, Derbys.

CLUB NOTES

HORNSEA M.C.—Excellent meetings continue, with a splendid variety of practical work in the woodwork and other classes and of Lectures. The subjects of the latter have included "*Diving*," "*Aeroplanes*," "*The British Army*," "*India*" and "*The Canning Industry*." Chemical experiments have included the distillation of water and the preparation of oxygen. Model-building continues under the direction of Mr. R. W. Shooter, Leader, and both indoor and outdoor games are played. Club roll: 33. *Secretary:* C. Kemp, 5, Carlton Terrace, Hornsea.

EXETER M.C.—The football season has now been wound up, with Kent Rangers the outstanding team of the year. Each of the teams in turn celebrated the end of a good season by a feast. Plans are being made for an extension of model-building operations. The Club now occupies an established position in Exeter, where a "Parliament of Youth" has been formed, in which the Club and the various football teams associated with it are well represented. Club roll: 156. *Secretary:* I. R. Coates, 103, Monks Road, Exeter.

BRANCH NEWS

HEMSBY STREET (NORFOLK)—A very successful excursion was made to Yarmouth, where members inspected engines, and saw how the Westinghouse and vacuum brakes work. The operation of a turntable also was explained. An interesting feature is that members were shown round by an old member of the H.R.C. *Secretary:* P. Powles, Yarmouth Road, Hemsby, Norfolk.

GAINSBOROUGH—The layout is now a continuous double track, with a goods yard at the principal station. New electric rails have been obtained and part of the track relaid and the rest overhauled. A new "Special" to represent an early morning newspaper train has been made up and put into service, with excellent results. Constructional work on locomotives and rolling stock has been introduced into the programme. Branch engines have been painted wartime black. *Secretary:* F. J. Newman, 26, Birrell Street, Gainsborough.

LONG ITCHINGTON—This Branch has now been incorporated. A Club Room has been secured and well fitted, and a good layout is now in operation. A new terminal station is being built, with a roof, and the chief train run is a miniature of "*The Cornish Riviera Express*." Photographs have been taken of the trains run. *Secretary:* H. Windsor, The Shop, Long Itchington, Nr. Rugby.

RECENTLY INCORPORATED BRANCHES

446. KING LANE (LEEDS)—Mr. D. M. Bickler, 211A, Harrogate Road, Leeds 7.

447. SAXONWOLD (JOHANNESBURG)—Mr. J. Harvey, 26, Northwold Drive, Saxonwold, Johannesburg, South Africa.

448. LONG ITCHINGTON—Mr. G. W. Herbert, Ivy House, Long Itchington, Nr. Rugby.

A Hornby G.W.R. Layout

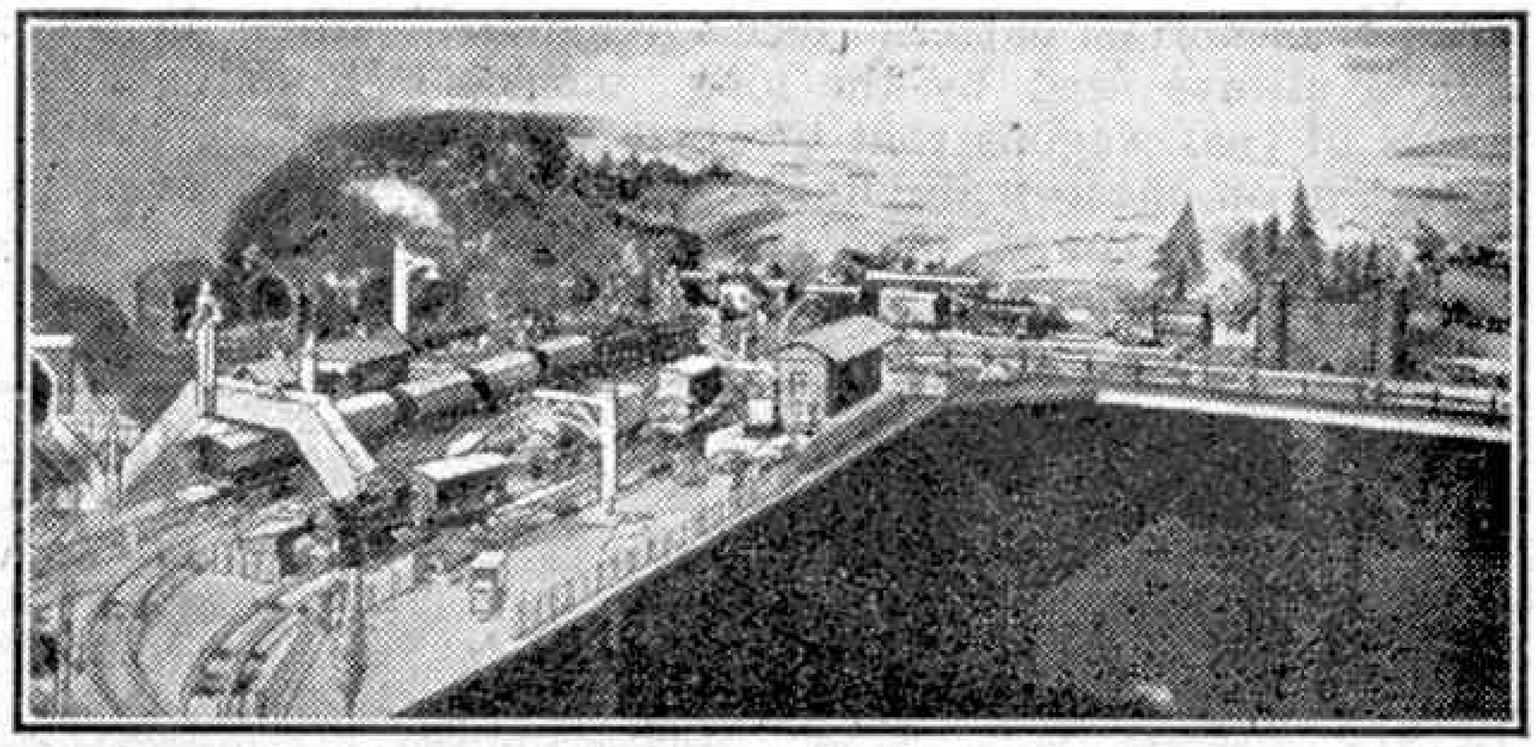
THE illustrations on this page show parts of the miniature railway of our reader P. H. Jenkins, of Bournemouth, and from the details supplied by him the following description has been prepared. The line represents an imaginary length of the G.W.R. main line, and there is in addition a branch line that links the continuous main oval with a terminus. The names of the stations smack of the West Country, "*Sidbury*" on the main line and the branch terminus "*Bridford*" being well chosen titles for the purpose.

The line started, as so many have done, in a small clockwork train set. This gradually developed to such an extent that it outgrew the space normally devoted to it; so the line changed in character from a portable affair into a permanent system, accommodation being found for it in an attic where the whole track occupied a space of about 12 ft. square. A permanent line on the floor has its disadvantages; a stiff back was the frequent reward of the operator in this case, and there were many instances of miniature cows and other lineside animals being trodden on, with fatal results! In the end a raised baseboard was erected about 3 ft. high and of a suitable shape for the layout plan, with the result of a great deal more convenience for the operator.

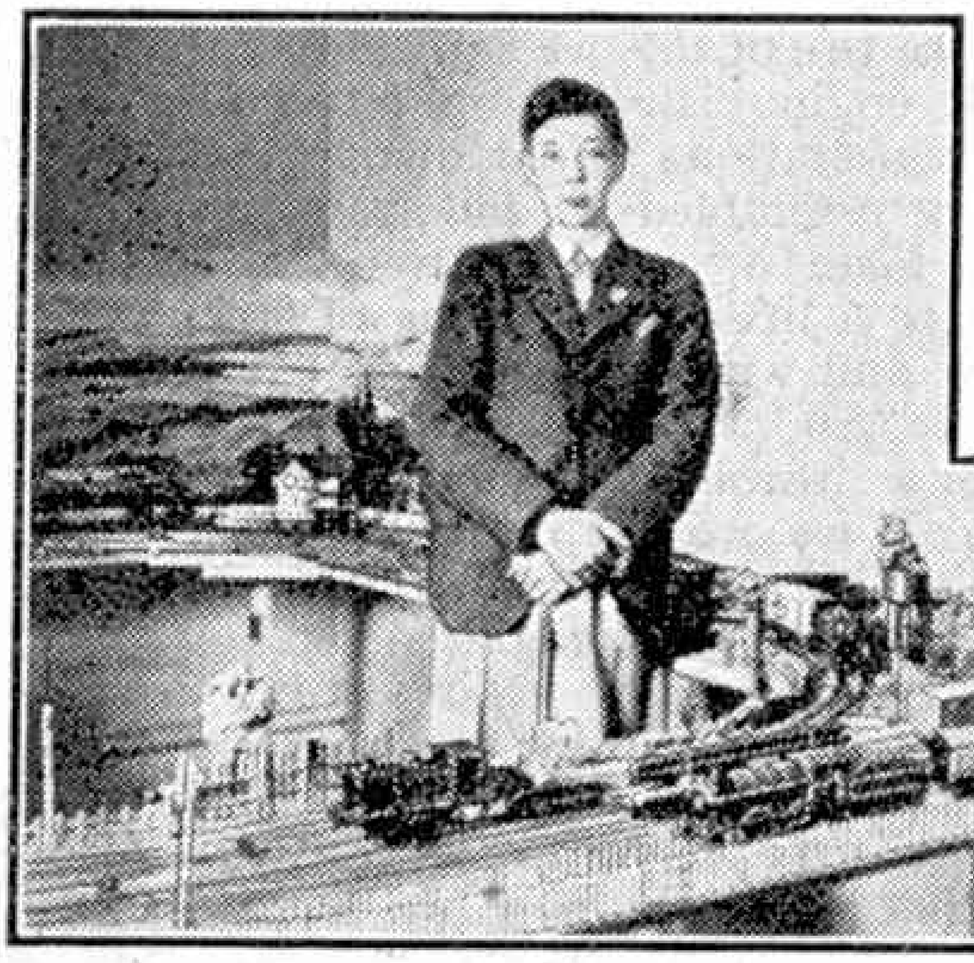
The track is screwed down to the baseboard and the line is correctly ballasted with fine granite chippings. This material has a realistic appearance, and it tends to reduce the noise that the trains always make when they are running on lines fixed to a raised board structure. There is an oval main line, and this is in effect a double track round three sides of the oval, a loop running parallel to the original single track. The terminus of the branch line "*Bridford*," is a well-equipped station, and it has, in addition to passenger traffic accommodation, a goods yard carriage sidings, engine shed and a turntable. The chief main line station, "*Sidbury*," also has its own goods yard.

To get some idea of the line and its working let us take a trip in company with the owner of the system, who describes a run as follows: "Our train is made up of Hornby No. 1 Coaches and is assembled alongside No. 1 Platform at '*Bridford*' in readiness for a non-stop run to '*Sidbury*'. A No. 1 Special tender Locomotive backs down from the shed and is coupled up. On getting the '*right away*,' from a Dinky Toys Guard of course, we move slowly over a level crossing, pass the goods and engine yards, and so gain the main line. We curve on to the loop and soon plunge into a tunnel. Emerging we pass another level crossing—they are frequent it seems, as this is a country district—and are then swallowed up in the depths of another longer tunnel. This piece of engineering work conveniently fills up one of the corners that are inevitable on any oval track. Like the first tunnel, it is made up of a wire-netting framework well covered with old newspaper soaked in paste, which was built up and moulded to the required outline. When the mass had dried painting was carried out to represent grass, rocks, boulders and so on, and Hornby Trees were then "planted," giving a splendid effect.

"After this long tunnel we dash through '*Butley*,' a typical wayside station, and continue along a good stretch of straight track. A curve follows, and the loop line resolves itself into the single main line. Actually we are now approaching '*Sidbury*,' but with the usual model railway licence we do not stop on this circuit but continue under a footbridge past another wayside station named '*Holston*,' and then, slowing gradually as the clockwork of our engine runs down, we finally come to a stop at '*Sidbury*' and the journey is over."



A busy scene on the layout described on this page.



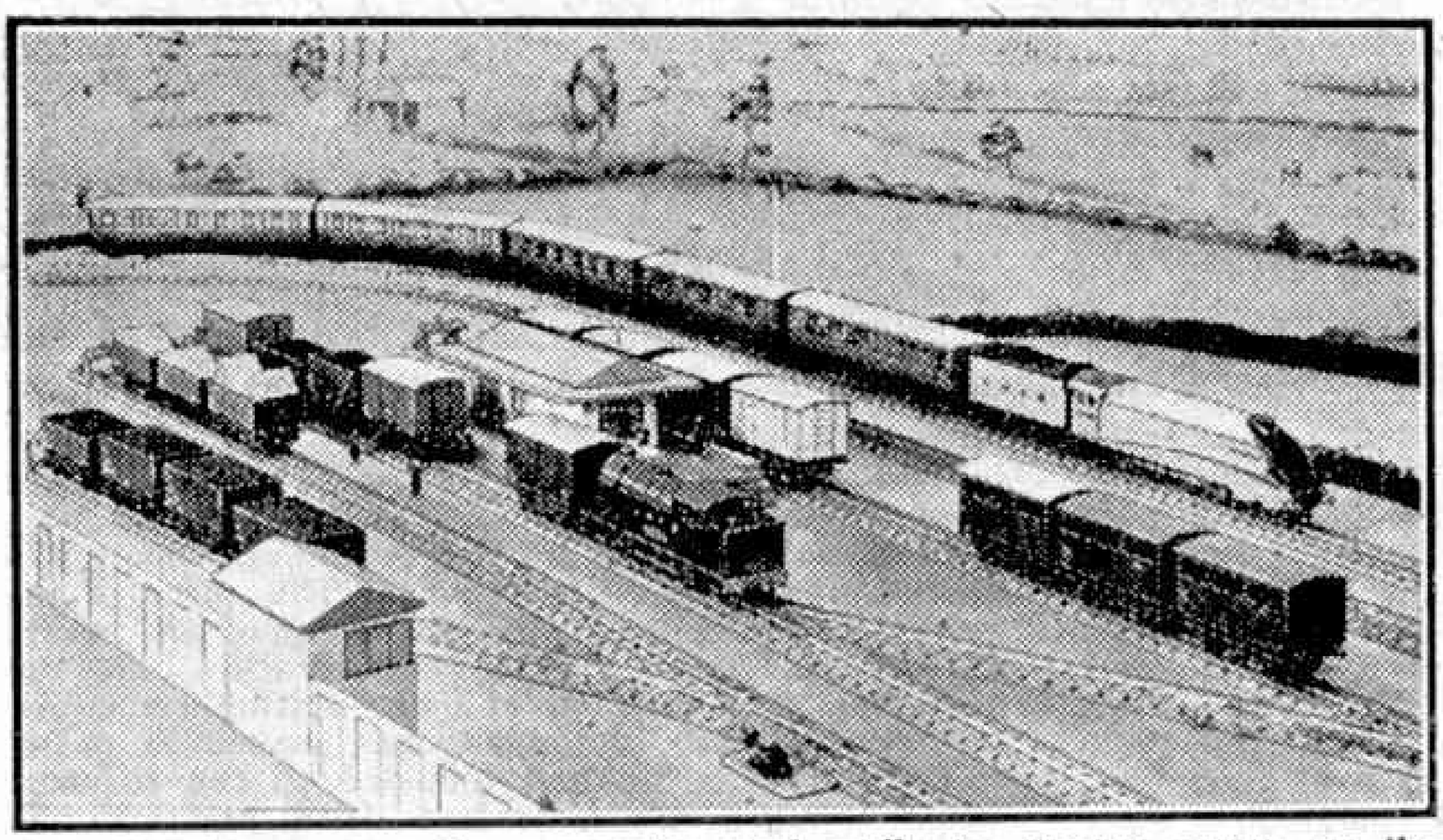
The junction of the "Bridford" branch with the main line. P. H. Jenkins, Bournemouth, the owner of the railway, appears in this illustration.

We shall have noticed various points in the course of the trip. A ruined castle figures in the scenery at one point so that the district evidently has historical associations; also there is a large and very complete farm laid out alongside the line, which means plenty of agricultural traffic. Both road and rail traffic is busy, there being plenty of Dinky Toys "people" and Motor Vehicles, and the scenic background gives an air of distance.

Realistic Dublo Traffic Working

ONE of the difficulties that now face the miniature railway owner is that present conditions make it impossible for him to add to his equipment.

Thus he has to arrange as realistic traffic working as he can with whatever stock he may have. Most likely there will be several standard Open Wagons, and perhaps a Coal Wagon, either high-sided or of normal pattern. One's imagination is always fired by the long "block" trains of coal wagons that are commonly operated on most main lines; so to run "the next best thing" on a Dublo railway we must use our ordinary Open Wagons in addition to our single Coal Wagon to carry the important freight. If we have a Brick Wagon we can use this as well, and we shall probably find that we have a train of quite respectable length.



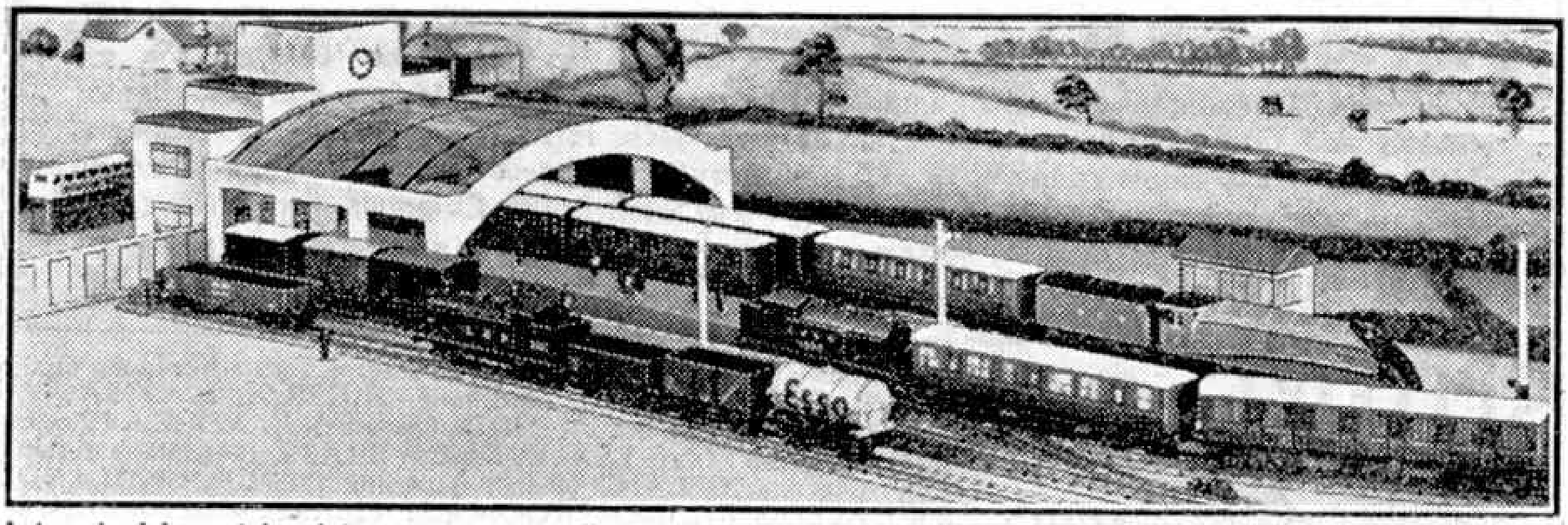
Shunting in progress in a wayside yard while an express passes on the main line.

If our little train looks lost because we happen to have a big layout, we can "pretend"—there is always some pretending to do on a miniature railway—that the train is a "special" that has to travel as soon as it had been made up to the load required. Another possibility is that the route is supposed to be heavily graded and the load has to be restricted on that account; at the same time "weight restrictions" may prevent the use of a larger engine than the Dublo 0–6–2 Tank, which again means keeping the load down. A point that should not be missed in the assembly of the train is that the Brick Wagon, if we have one, should be placed next to the engine. The real vehicles are fitted with automatic brakes, and if coupled up next to the engine the braking power is useful in assisting the control of the train on down grades.

Probably the best fun is obtained in miniature freight working if we have plenty of "shunts"; not necessarily the big shunting programme carried out in a large yard, but the ordinary wayside "shunts" carried out by pick-up goods trains in the course of their daily round. Running such trains as these allows us to include almost any type of vehicle in the train, even those for perishable traffic if they are being "returned empty." We can in fact begin operations with the smallest possible train, an engine and a goods Brake Van. These can start off down the line, and on the average small oval layout with one goods yard, or possibly only a single siding, they will have to make several circuits of the track, calling at the yard or siding to pick up one or two wagons each time. Similarly certain vehicles can be put off in turn as if they were being taken from point to point on a real railway. There is no end to the fun that can be had in this way; different vehicles or combinations of vehicles can be dealt with each time so that quite a "busy" air is given to operations even if we have only a few actual Wagons and Vans to deal with.

If we tire of this we can assume that our Tank engine is working a pick-up trip between stations in our district, and that, having assembled its full train, it runs it to a main or concentration yard. Here perhaps a little marshalling of stock takes place, and with a change of engine to the 4–6–2 *"Sir Nigel Gresley"* the train can make a "through journey" to its destination. If we are not lucky enough to have one of these streamline locomotives we can use our Tank engine again.

By our pick-up goods train methods we can always work our freight to its destination, but traffic that is specially urgent may have to be dealt with in another way. Suppose we have a Cattle



A terminal layout in picturesque surroundings. The scenery is realistic in appearance and conveys a fine sense of distance.

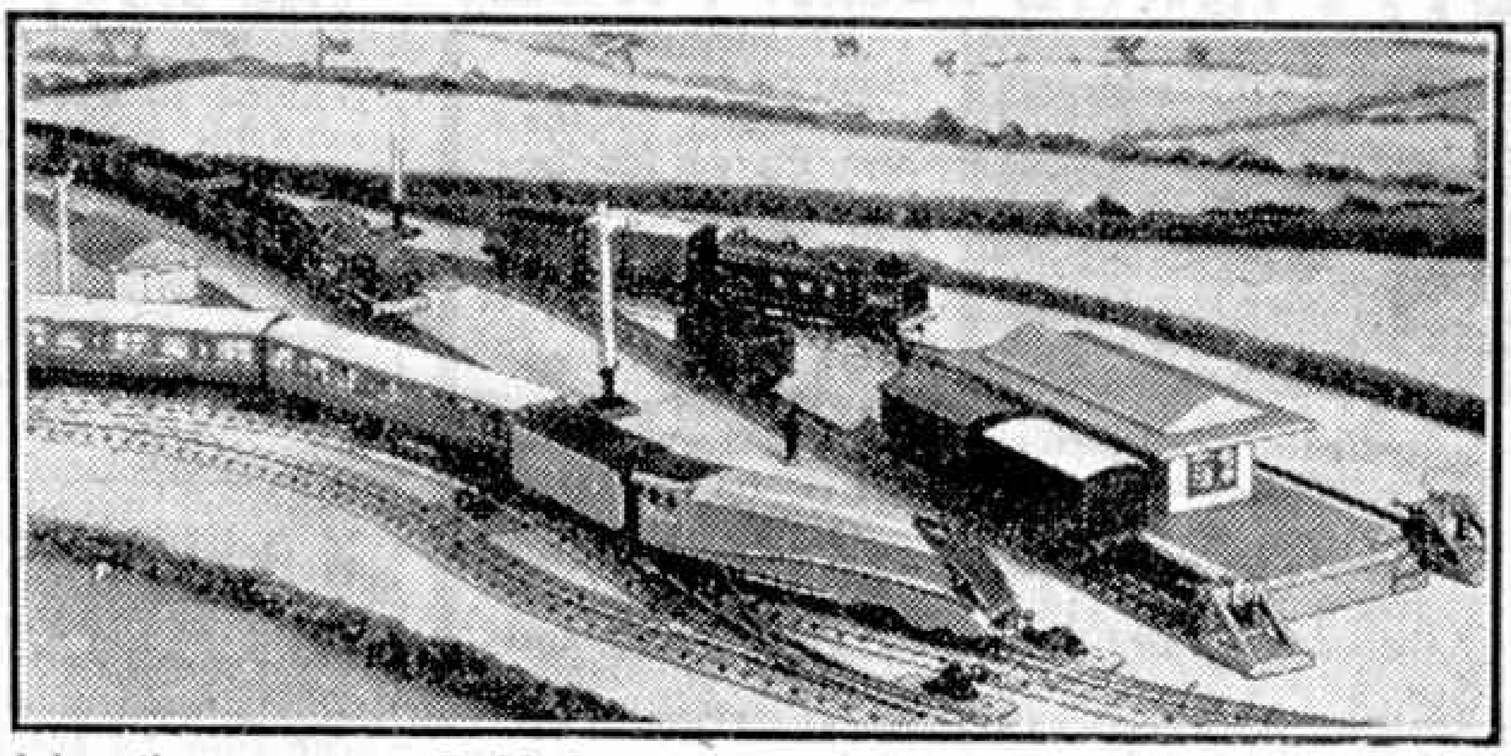
Truck and a Horse Box that require immediate conveyance, or possibly one or other of the perishable traffic vans of the Hornby-Dublo range such as the Meat Van. We can forward these by the next passenger train if we wish. This plan is often followed in real practice and in miniature it adds to the fun and realism of train working.

What happens to our urgent traffic if there is no passenger train due for a considerable time? We must then arrange to run a "special," made up of just the Vans in question with a Brake Van at the rear, and of course an engine to haul it! Little "specials" of even two or three vehicles are sometimes seen in actual practice.

Those who have not any of the perishable traffic vans such as the Meat Vans and Fish Vans of the Dublo range need not worry unduly as long as they have one or two of the standard vans to substitute for the "special-purpose" vehicles." Nowadays there is not a great deal of difference in external construction or finish between the various types of covered vans; so with a little bit more "pretending" we can convey perishable traffic quite well using the standard vans.

Where actual loads are carried in the Open Wagons, and most bo take some interest in loading their vehicles of this kind, good use can be made of certain of the items of miniature luggage included in the Hornby Series. If we have not got these, then quite a number of little oddments can be fixed up at home to represent cases, drums, and so on. Small blocks of wood can be shaped up and made to look like big cases with the aid of a few pencil lines. Small corks can be cut down and carved a bit with a sharp penknife to make them look like barrels or drums; they can be painted if required in order to finish them off. Small round tins or cardboard pill boxes can be made into quite realistic cable drums.

Larger loads such as miniature containers may be attempted by the more ambitious enthusiasts. Their shape is not difficult to reproduce, while for details of their finish, some notes may be taken from the real thing as they are quite commonly seen both on rail and road. An ordinary Open Wagon can be used to carry a container in the absence of a special "container flat." This happens quite frequently in actual practice. Another point in connection with container traffic is that we must not forget the road part of the business. For this very good use can be made of the flat lorries included in the Dinky Toys Motor Vehicles. Covered Vans can be used similarly for other traffic.



A junction scene on a Dublo layout; an express passes through this junction while an empty train is held at the home signal.

Stamp Collecting

The Modern Collector

By F. E. Metcalfe

STAMP collecting has been booming for some time, and a dealer friend who has been closely connected with the hobby for many years stated the other day that since the emission of King George V Jubilee stamps, eight years ago, the number of stamp collectors in Great Britain had increased by at least 30 per cent. and that two-thirds of these new chums had joined our ranks since the beginning of the war.

The writer's own observations tend to confirm this and, what is more, new collectors seem to be coming along all the time. If dealers could obtain 10 times as many albums as they are actually able to get hold of, they would have no difficulty in selling them as fast as they came to hand. While on the question of albums, readers who need new ones had better get busy at once, for a Board of Trade order which came into operation as long ago as 14th September 1942 prohibits the use of paper for "any albums." So it would appear that any stamp albums yet on sale are old stock, which probably cannot be replaced until after the war.

Even stamp catalogues sell like the proverbial hot cakes, dear as they undoubtedly are and, owing to the time in press, out of date as one finds so many of the prices when they do appear.

Yes, stamp collecting must be booming.

And what about these new collectors? What do they collect? Well, if we answer these questions in detail, maybe what we have to say will be of use to others who contemplate taking the plunge.

In the first place it is not considered that those who have bought stamps as an "investment" can in any way be considered collectors. They are simply speculators, and as such quite outside the pale. There are plenty of them about, of course, in spite of the fact that so many burnt their fingers when they rushed in to buy Coronation stamps. Many who thought a "penny-black" was a shoeshine bought scores of sets, thinking that they would go up in price, as had the Jubilee stamps, not realising that it was actually their own huge purchases which would definitely prevent any such rise.

We all know what happened.

The price of "Coronations" fell to almost half face value, and they can still be bought for about the same cost as when they were first purchased, and the speculators all managed to get out at the ebb, for which we can be duly thankful.

There was also another scramble just after the outbreak of the present war. It was common knowledge that stamps kept their value during the last slump years, better perhaps than most other forms of property, and no doubt with this in mind "investors" fell over one another to buy postage stamps. Whilst stamps in general have undoubtedly increased in value since then, it is probable that the war speculators will fare no better when they come to sell out than did those who bought "Coronations," for the simple reason that in many instances they did not know what they were buying, nor had they much, or any, knowledge of stamp values.

Of course "knowing ones" put them on to the "classics," which is the name given to a number of early issues of various countries. Now the "classics" are all right as far as they go, but they are not always what they seem, and one needs to be an expert to separate the grain from the chaff. These "investors" can have little idea how cleverly many of them have been cleaned and repaired. Some will learn one day, when they come to sell, and the lesson may be a bitter one, for doctored stamps are not worth a tenth of the genuine thing, as they will find out to their cost; but all the genuine collectors need say is "Serve them jolly well right."

And what of the pukka collectors who have joined our ranks during the past few years? Well, of them it can be safely stated that generally speaking they have been well guided in what they have chosen to collect, for a large percentage have gone in for modern British Colonial stamps. If they exercise reasonable care they cannot go far wrong. People who should know better have described current colonial stamps as "pretty-pretties," "picture paps," etc., but collectors can safely ignore such remarks, which lack even the merit of being disinterested. The stamps to which these stupid expressions have been applied are among the most beautiful in the world, and never previously have our colonies emitted artistic gems to equal them. The "Old Classics," so assiduously boosted, are not in the same class for sheer beauty.

Moreover these modern stamps are within the reach of most of our pockets. As a matter of fact the writer recently saw a collection, made by a boy whose pocket money is two shillings a week, which would put to shame many collections of old stamps which had cost 10 times as much.

Our young collector had been given a loose-leaf album for Christmas, and he had started buying current colonial sets up to 3d. face value. These obtained, (*Continued on p. 249*)

Stamp Gossip

and Notes on New Issues

Amongst the many matters philatelic there are to talk about this month, the new "Rex" catalogue, devoted entirely to the colonial issues of the reign of George VI, must not be overlooked. Such a work was badly needed by the hosts of collectors of these fascinating issues, for it is quite evident that established catalogues are not prepared to do them justice.

Unfortunately readers may have some difficulty in obtaining a copy, for the edition was evidently limited, and as it was published at the modest figure of 2/6 those on offer were soon snapped up. But the catalogue is well worth a search. Of course, like most first editions, it has some room for improvement, but that is not a peculiarity of new catalogues, and at any rate a genuine attempt has been made to give collectors what they want. Moreover the "Rex" is right up to date, another novelty, with stamps listed that appeared as recently as April of this year.

As usual we have only space to deal with a portion of the new stamps and varieties that have appeared this month. Of British Colonials the most important news is the release of a new printing of the entire set of St. Lucia. There is no change worthy of notice amongst the high values, but those from ½d. to 3d. (except the 1d., which had already appeared thus) have now been issued with perforation 12½.

Whilst on the question of current colonials, a word of warning should be given regarding the 5d. value of Gambia. This is being offered for as much as 2/6, whereas its actual value is a copper or so above its face value, for a new printing is in preparation, and as a matter of fact should appear any time now.

By the time these notes are in print the Cairo overprints of British stamps for use in the Middle East will be on sale in England, for there was official advice that they were to be released in London on 15th June. As was mentioned on page 177 of our issue for May, when the stamps in question were being offered to collectors at a substantial premium over face value, there will be plenty for all those who do not wait too long before buying, at a fraction above issue price, so those who bought some time ago against advice will probably have paid a good deal more than they need have done.

New stamps for French North Africa are expected in the near future. In the meanwhile "Free Country" issues are still appearing. We have recently had two modest sets from Free Yugoslavia. These were welcome enough, and as quantities printed were limited those who got in first did quite well for their collections, but the set of the month is the gigantic issue of 59 values of overprinted stamps from Free French Somaliland.

This looks like being a costly set as time goes on, but it is to the great credit of the Free French Authorities in London that they handed the stamps over to the trade at a very modest figure. As a matter of fact this has been their policy all along. Collectors, not to overlook dealers, owe them a debt of gratitude for the way they have brought over these various Free French Colonial stamps from the various countries and marketed them at virtually face value. Many collectors are forming fascinating collections of these interesting overprinted stamps, thanks to the organisation of General de Gaulle.

Those legions of collectors of Ship Design stamps have had a lean time lately, so they are sure to welcome the new set of stamps recently issued by Portugal. We are illustrating one of these. They only differ in colour, and a caravel in full sail is the motif. Another interesting stamp is that issued by Switzerland to commemorate the centenary of the first postage stamp of the Canton of Zurich. The original cantonal stamps are beyond the pocket of most of us; the new reproduction would be very welcome, if we could only obtain a copy, but ironically enough, very few of these will be available for collectors here until after the war.

Few countries have produced such beautiful stamps as Liberia, but the habit of the Government of that country to sell, at knock out prices, stamps which have been withdrawn, has caused more than one pang to collectors who bought whilst the stamps were current. The writer remembers buying the attractive 1918 set in the Monrovian Post Office, at a price which left him hard up for the rest of the month. Alas, that set isn't worth half as much to-day, but its possession gave a lot of pleasure at the time, so that is worth something.

However two new Liberian sets have now appeared, both really beautiful. One is for an air service which may, or may not exist, and the other for ordinary postage. The latter set is printed in two colours, and each stamp depicts one of the rare animals in which the forests of Liberia are so rich.

F.E.M.

The Modern Collector—(*Continued from page 247*)

he had then gone in for the other values up to 1/-. All were nicely mounted and all formed a collection which was a positive joy to inspect.

There is only room to illustrate one or two of the beautiful stamps similar to those in that collection, but which of the wonderful old stamps equal these "pretty-pretties?" And these "picture paps" only cost coppers, not pounds, and we know they are what they seem — whole stamps, not patched up specimens.

Yes, the modern collector has chosen well when he has gone in for the colonial stamps of his own generation.

The Air Transport Auxiliary—(*Cont. from page 219*)

movements of all the pilots A.T.A. have to run a meteorological section of their own to tell their Pools and stray pilots just what weather to expect next day, or before they start, wherever they may be going. For the orders to each pilot depend largely on the official weather forecast. If the weather is going to be bad in one area, a job will probably be found for him in a fair-weather area.

On top of that, Fighter Command, R.A.F., and the Royal Observer Corps have to be told the route of each pilot and what machine he is flying, so that he shall not raise air-raid alarms as he goes along, and, on the other hand, shall not be shot down by our own guns and fighters. But sometimes the ferry-pilots have had near squeaks of being shot down by enemy "intruders." And, I have been told, sometimes the pilots of the faster machines have had good fun chasing enemy aircraft. Also, at least once, an innocent ferry pilot has been known to land at an aerodrome which was in the middle of a hearty blitz on its own.

So, you see, ferrying aeroplanes for the R.A.F. is not just a matter of being flown to a factory aerodrome, getting into a new aircraft, and flying off to an R.A.F. station and coming back to Pool or to H.Q. at one's leisure. It is real hard work for the pilots and their flight-engineers in the big machines. And there is all the risk of flying, which has still not been removed by our clever designers. There is fog and low cloud to be beaten, and all the other dangers due to act of God and the King's enemies.

Also, it is hard, tiring and worrying work for the people on the ground who have to organise all the movements of the flying people. Every one of them is doing splendid work in the Nation's war effort. So we owe thanks to Commodore, as he is now ranked, Gerard d'Erlanger for the job he is doing, and to Captain Philip Wills, the Chief Operations Officer, and to Captain (Miss) Pauline Gower, who raised and commands the Women's Section, and to every man and woman of the A.T.A. for the way in which they keep supplies of aircraft moving to the R.A.F.

The Diesel Engine Locomotive—(*Cont. from p. 231*)

locomotives, and each case must be taken separately. But, as stated before, there is no doubt that the Diesel-electric drive is the most popular for main line work, and it has established a reputation for reliability and freedom from breakdown which it would be hard to beat. On the face of it, of course, it may seem strange to the average boy that engineers should design a form of rail traction which first of all uses a Diesel engine to drive an electric generator, the latter in turn driving electric motors which transmit their power through spur reduction gear to the axles. However, it should be remembered that the efficiency of the electrical gear is very high, and the intermediate "cushion" effect, so necessary in all rail traction, is almost comparable to that of the steam locomotive.

British railways as well as others throughout the world are very much alive to the benefits of the heavy oil engine as a means of speeding and cheapening rail transport. An endeavour is being made therefore to determine the proper place which the Diesel engine must take up in railways of the future. Every year more and more valuable data becomes available from experience gained in the operating of Diesel engine locomotives; every year more railway chiefs are enquiring about the advantages of this new prime mover and the questions of suitability for their particular type of service as regards acceleration, speed, comfort, economy, etc. Some few years ago the chairman of a well-known railway in America said that there was such a large margin of economy attainable between burning coal or oil in the fire-box of a steam locomotive and burning oil in the cylinder of a Diesel engine locomotive that there was no doubt that it would pay them well to replace over a series of years all their steam locomotives with Diesel engines.

(*Next month: "The New Power In Practice."*)

Making the Most of Locomotive Power—

(*Continued from page 221*)

Newcastle! After about 3 hours' standing at Newcastle, a second set of Newcastle men took the engine to Edinburgh on the 1.14 a.m. sleeping car express, and brought her back to Newcastle on the 8.5 a.m. from Edinburgh.

From about 11 a.m. till 8 in the evening of the same day the engine stood at Newcastle, at which time she took up the haulage of a night express arriving in London in the small hours. In the course of this last journey the engine was manned successively by Newcastle, Peterborough and King's Cross men. Thus the engine was away from her home station for 36 hours, during which time she covered 788 miles and was handled by seven different sets of men!

45 Years of Railway Photography—(*Cont. from p. 223*)

working owing to the grouping. The bulk of the West Coast Scots expresses, previously in charge of Caledonian engines north of Carlisle, were now hauled by Midland "Compounds," as were many of the Glasgow and South Western trains. Shortly after this all G. and S.W. engines were broken up, and the Midland "Compounds" were largely replaced by Stanier 4–6–0s of both the 6 ft. and 6 ft. 9 in. classes, which worked the bulk of the trains on the Caledonian, G. and S.W. and Maryport and Carlisle lines; whilst the N.E. engines were displaced in favour of L.N.E.R. "Pacifics." As these engines could all be seen at Euston or King's Cross, it will be understood that the glamour of novelty at Carlisle had vanished.

On looking back on these early tours, it is a matter of some mystery to me how I managed to cover so much ground with those large heavy cameras and luggage. I always took a sufficient supply of plates for the whole trip, which meant quite eight dozen, as one could not be sure of obtaining them whilst travelling. These plates, with the necessary luggage and a heavy camera and a mackintosh, make a pretty good load for touring, because this was before I owned a car and had to travel by train and "footslog."

(*Next month: "Memories of York and Elsewhere."*)

Gears for "Cyclone" Engines—(*Cont. from p. 227*)

plus the multiplicity of teeth—a driving gear in a "Cyclone 14" has 135 teeth—all combine to form a grinding requirement that was solved by creating the largest battery of gear grinders in the country.

Grinding wheels are of two types. One type has an edge shaped in the form of a tooth and fits between the teeth to grind two faces at once. The other type is a thin flat disc; the gear is rolled against this wheel just as it would roll against a meshing gear. Diamonds keep both types of wheels dressed to sharpness and accuracy. A 20-tooth gear requires six minutes to grind; other gears require nearly an hour.

Emerging from the grinding machines, the gear has the correct tooth shape, together with the proper hardness. There still remain, however, several final operations, the ultimate in refinements.

With the exception of a few special cases, all gears are lapped after grinding to remove any faint wheel fuzz produced by the grinding operation, also to smooth out any wheel marks. The gear in the process of manufacture is rolled against a "lapping" gear covered with a soupy liquid made of water or other lubricant and an ultra-fine abrasive compound.

All surfaces of the gear are polished to the "superfinish" used on aircraft engine parts, thus eliminating any faint scratches or tool marks where fatigue cracks might start. Finally, workmen with skilled hands go over the entire gear, using a small high-speed electric burr to gently round off sharp corners. Their touch is deft, for they must just "break" the edge and create a radius without at the same time grinding through the surface hardened by carburising or nitriding.

Next, a thorough going-over by hawk-eyed inspectors, before the parts are shipped for assembly into engines.

Competitions! Open To All Readers

What Locomotives are These?

"M.M." readers generally are familiar with the names of the principal locomotives of British railways, and find them fascinating, both for themselves and for their associations. This gives material for an easy and enjoyable contest suitable for the summer month of July. In the adjoining panel is a series of words or phrases, 20 in all, each of which provides a clue leading directly to the name of a British locomotive. Some of the 20 puzzles are easy; others perhaps not so easy, but all will be found interesting by competitors.

1. **Appreciated by the blind.**
2. **Lost his head.**
3. **A half-hearted sort of chase.**
4. **A modern instrument of war is indicated.**
5. **No doubt has often repeated a famous ride.**
6. **We ought to laugh at it.**
7. **A famous aircraft carrier.**
8. **Remains on the ground in spite of his name.**
9. **Well known for holidays and enemy aliens.**
10. **In Britain's front line.**
11. **A very speedy wild fowl.**
12. **The only one in its shed, surely.**
13. **A New World river.**
14. **You can't ride one of these, on sea or land.**
15. **The fourth and last of his name.**
16. **A well known range of hills.**
17. **Held up the world; in North Africa?**
18. **Is it really a metal?**
19. **Suggests an early commando raid.**
20. **Sounds salty.**

As an example of what we wish readers to do, the first clue, *"Appreciated by the blind,"* rather obviously leads to *"St. Dunstan's,"* the name of L.M.S. "Patriot" No. 5501. With this as an example, readers should have no difficulty in tracking down the rest of the locomotive names and in each case the number, class and owning company also should be given.

The Contest is divided into two sections, for Home and Overseas readers respectively, and in each prizes to the value of 21/–, 10/6 and 5/– will be awarded for the best solutions. If there is a tie for any prize neatness and novelty will be taken into consideration by the judges. Entries must be addressed *"Locomotive Puzzle Competition, Meccano Magazine, Binns Road, Liverpool 13."* The closing dates are: Home Section, 31st July; Overseas Section, 31st January 1944. As announced on page 217, Overseas competitors are now allowed more time.

Howlers!

Below we give three remarkable stories, each of which is full of mistakes or howlers. We ask our readers to pick out the errors with which these paragraphs are strewn. There are plenty of errors to find, including both mistakes of fact and contradictions that will be obvious immediately on reading the stories themselves.

1. **"Climbing up to the stratosphere in his little 'Fortress' fighter monoplane, Ace Flyer, the famous airman, pushed back the cockpit cover and looked over to make sure that his landing wheels were in order. Then he set out on his long 700-mile flight. On reaching his destination he moved over to the bomb aiming position and he released the load as his aeroplane dived downward at 180 m.p.h., the wind whistling through the wire bracing of the wings."**

2. **"When the French conquered Asia under their great Leader Marlborough, they owed their victory to the superiority of their bows and arrows to the old-fashioned shot guns of the native Americans. The greatest fight came when the wall round London was attacked, but Marlborough simply said 'We must get there. Up, Guards, and at 'em.' The army then pushed on to Cabul."**

3. **"A new vehicle has been invented for travel through unknown lands. This will make exploration anywhere a pleasure. It is all-electric, taking current from a third rail, and water is laid on. Salvage of course is important, and a scheme has been arranged for a daily call by the dustman, who will also provide the newspapers that are later to be salvaged. A submarine is carried, as many of the explorers who use the vehicle will desire to keep as dry as possible when penetrating jungles in Arctic regions."**

There will be the usual two sections, for Home and Overseas readers respectively. In each section prizes of 21/–, 10/6 and 5/– respectively will be awarded to the readers who submit the three longest lists of genuine errors discovered in these paragraphs. In the event of a tie neatness or novelty will be taken into consideration. Entries must be addressed: *"Howlers Contest, Meccano Magazine, Binns Road, Liverpool 13."* Closing dates: Home Section, 31st July; Overseas Section, 31st January 1944.

July Photo Contest

This month's contest is the 7th of our 1943 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions: 1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if desired, but entries in which the second condition stated above is not observed will be disqualified.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed *"July Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13."* There will be separate sections for Overseas readers. In each section prizes of 15/– and 7/6 will be awarded. Closing dates: Home Section, 31st July; Overseas Section, 31st January 1944.

Fireside Fun

"So you are on a minesweeper, are you, sailor? Where do you sweep the mines?"

"Just round the top, lady. That's where the dust settles."

* * * *

"Don't come in the shop for a minute, Sarah. I'm trying to sell a bottle of fat reducer."

* * * *

A touring eastern go-getter spied a lazy Indian chief lolling indolently at the door of his teepee somewhere out west.

"Chief," remonstrated the go-getter, "why don't you get yourself a job in a factory?"

"Why?" grunted the chief.

"Well, you could earn a lot of money. Maybe 30 or 40 dollars a week."

"Why?" insisted the chief.

"Oh, if you worked hard and saved your money, you'd soon have a bank account. Wouldn't you like that?"

"Why?" again asked the chief.

"For gosh sakes!" shouted the exasperated go-getter. "With a big bank account you could retire, and then you wouldn't have to work any more . . . . . "

"Not working now," pointed out the Indian.

"*Excavating Engineer*" (America).

* * * *

"Don't blow it; it's bad mannered. Fan it wiv yer cap like I do!"

* * * *

BRAIN TEASERS

A HIDDEN PROVERB

Here is a pyramid of letters that does not seem to make much sense, but by passing from one letter to another, moving in any direction, a well-known proverb can be read in it.

```
                F
              E   A
            T   A   F
          H   E   S   O
        L   F   R   D   R
      O   T   O   T   B   I
    C   K   G   E   H   E   R
```

(T.K.C.)

* * * *

CAN YOU FIND THESE?

The names of nine leaders in the war are hidden in the following sentences. Can you find them?

In a port all ships are berthed or anchored.

The brook enters the low lands and meanders on through the fields before losing itself in the marsh all along the dunes.

We met Alex and Ernest pounding along on their bicycles, and from their pace Ben estimated that they would reach their destination in an hour or so.

You are not allowed past a line on the edge of the parking place.

* * * *

"So Old Pete's gone, has he! Did you miss him?"

"No. That's why he's gone. I never miss!"

* * * *

TWO BOYS WITH ONE BICYCLE

Now for a little bit of easy calculation. Two boys who set off to go to a town four miles away had only one bicycle between them. The first rode for two miles and then concealed the machine in a hedge, where it was afterwards picked up by the second boy, who had walked this distance. The second boy overtook the first on entering the town. Both boys could walk at 3 m.p.h. and cycle at 15 m.p.h. How long did they take to reach their destination? (T.K.C.)

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

To arrange five pennies so that each touches the other four place one flat on the table, and on it put two others, also flat, so that they touch each other at a point just over the centre of the first. Now stand the remaining pennies on edge, one on each of the visible portions of the first penny, move them inward to touch the second pair and lean them towards each other so that their upper edges are in contact.

Our second puzzle was a tongue twister that requires no answer. To see how the third one works out suppose we call the number thought of N. Then the victim of the trick successively gets 3N, 3N plus 11, 12N plus 44, 12N plus 50, 24N plus 100, 22N plus 100, and 11N plus 50. Taking away 50 and dividing by 11 clearly leaves N, the original number.

* * * *

THIS MONTH'S HOWLER

The Royal Mint is the stuff the King puts on his roast lamb.

BINDING THE "M.M."

Binding cases for the 1942 "M.M." can be obtained from Messrs. O. H. Bateman & Co., 23, Hanover Street, Liverpool 1. They are supplied in Quarter Basil, full cloth, embossed in gold with the name "*Meccano Magazine*," and with the name and volume number on the back. Price 6/6 post free.

These binding cases are supplied so that readers can have their Magazines bound locally, but where desired the firm mentioned above will bind the 12 issues of the 1942 "*Meccano Magazine*" at a charge of 12/-, including the cost of the binding and also return carriage. The covers of the Magazine may be included or omitted as required.

This Month's Special Articles

MECCANO MAGAZINE

Registered at G.P.O., London, for transmission by Canadian Magazine Post.

EDITORIAL AND ADVERTISING OFFICE:
LIVERPOOL 13, ENGLAND.
Telegrams: "Meccano, Liverpool."

Publication Date. The *"M.M."* is published on the 1st of each month.

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/-. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Readers' advertisements are published as soon as possible; inclusion in the first issue after receiving them cannot be guaranteed.

Small Advertisements. 1/8 per line (average seven words to the line), or 20/- per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

READERS' SALES AND WANTS

SALES

"M.M.'s": all 1942 except July; October–December 1941. Write for prices.—J. Hanmer, Bettisfield Park, Whitchurch, Salop.

"Wonders of World Engineering," Parts 1 to 44, inclusive; perfect condition. Offers.—Harry Woodhouse, Netherdene, Lound Road, Kendal, Westmorland.

Over 850 Foreign and Colonial Stamps in Album. What offers?—N. Peach, Hill Crest, Oakerside, Nr. Matlock, Derbyshire.

One Pair each Crossover, Parallel and Symmetrical Points; Curved and Straight Rails; Three Mill's Scale Vans for Sale or exchange for Meccano Parts.—57, Southview Road, Southwick, Sussex.

"M.M.'s" June 1938–December 1941, each year complete; 4/6 per year. Postage extra.—Potter, 76, Hillcrest Road, Romford.

45 "Aeroplane Spotter," Nos. 10–58 (Nos. 51, 49 and 35 missing); also pair "Wonder" Midget Magnets. Exchange for Meccano Parts. Offers.—A Yates, 44, Cold Onn Road, Flint.

Dinky Toys; Britain's Soldiers; Animal and Zoo; Meccano; "Picture Show" Magazines. Details.—22, Ember Lane, Esher.

"M.M.'s" Jan. 1941–April 1943; 11 Railway Magazines; "History of England"; "The Navy," Sept. 1940–March 1943. What offers.—C. Pickering, 68, Cole Park Road, Twickenham.

Quantity Hornby Dublo Electric Parts, Switches, Rails and Rolling Stock in good condition. Write for particulars.—39, Fore Street, St. Ives, Cornwall.

Hornby "0" or "00" Set or Parts. For Sale or exchange: Juneero Set, Ray Cinema, Meccano Pinions, Hub Discs, etc., "M.R.N.," "M.M." 1942.—Usher, 27, Mossgiel Crescent, Dundee.

WANTS

"Aeroplane Spotters" Nos. 79; 80; good condition. Will purchase or exchange two of "Spotter" Nos. 49, 54, 55.—S. Gee, 40, Webster Road, Liverpool 7.

Christmas Greeting Airgraphs; good prices paid.—Hill, South Grove Central School, Rotherham.

Hornby E320 20 volt Electric G.W.R. "Caerphilly Castle"; E320 20 volt Electric Tank Locomotive; G.W.R. Corridor Coaches. Price and condition to—6, Cloister Road, N. Acton, W.3.

Hornby Solid Steel Tracks; Bassett-Lowke Corridor Coaches; any make Permanent Way and Points; Bakelite, Trucks, Accessories.—Smart, 101, Harborne Road, Edgbaston, Birmingham.

Two Dinky Toy Tractors and Mechanical Horse and Trailer.—Turner, Charlton House, Hartlebury, Worcs.

4 doz. Nuts and Bolts; state price.—Scott, 5A, Clifton Park, Bristol.

Two Trix Reduction Gears, Nos. 31/3; One Reversing Arm and Pawl, No. 31/10; also a number of Straight Rails.—Cawthraw, 19, Lawn Road, Exmouth.

Clean "M.M.'s" for February and August 1942.—Harding, 39, Helder Street, South Croydon, Surrey.

One No. 1 Passenger Coach and One No. 1 Guard's Van. State price.—Hall, Four Gables, Allestree, Derby.

20-volt Reversing Motor; also Sprocket Chain and ½ in. bevel gears. Pay good price.—M. Lane, White House Farm, Foulridge, Nr. Colne, Lancs.

Geared Roller Bearing part No. 167; complete Helical Gears part Nos. 211A and 211B; also any Meccano parts or Dublo electrical items; damaged or otherwise, send particulars of price, etc.—Bacon, 14, Springwell Gardens, Churchdown, Gloucester.

Meccano Gear Wheels; also Nuts and Bolts.—A. Marwood, Westfields, Wymondham, Norfolk.

Meccano Clockwork Motor No. 2; cheap; good condition.—C. Adams, 15, The Freehold, Hadlow, Nr. Tonbridge, Kent.

Nine Bassett-Lowke gauge "0" 3 ft. 3 in. radius Steel Curves and some Straights; in good condition; One Stretcher Rod for "Hobbies" A1 Fretmachine. Price and particulars.—Rayner, 28, Weigall Road, Lee, S.E.12.

"Meccano Magazine" November 1942; as new; full price and postage paid.—Verran, 239, Queen's Road, Wimbledon.

"Meccano Magazines" for 1940; also a stationary Steam Engine and an Air Gun.—B. Whitaker, 36, Lansdowne Street, Burnley, Lancs.

Hornby Dublo Electric Points in good condition; also Dinky Toys.—35, Gaynes Hill Road, Woodford Bridge, Essex.

"Magnets" prior to 1938, "Schoolboys' Own Library"; "Boys' Friend Library"; "Triumphs."—191, Baker Street, Enfield, Middlesex.

"Picturegoers," from mid 1937 onwards. Apply—Peake, 12, Sidney Road, Woodford Halse, Rugby.

Super Model Leaflets Nos. 1, 19, 22, 27 and 37; Two Reed Hooks, No. 105.—Trevor, 2, Oakfield Terrace, Cuckoo Lane, Gateacre, Liverpool.

Fritum M.G. Blank Cartridge Automatic Pistol; must be complete and in good working order. Please send particulars to—T. B. F., Greengates, The Oval, West Shore, Llandudno.

PUBLISHED BY MECCANO LTD., BINNS ROAD, LIVERPOOL 13, ENGLAND
Printed by John Waddington Ltd., Leeds and London.