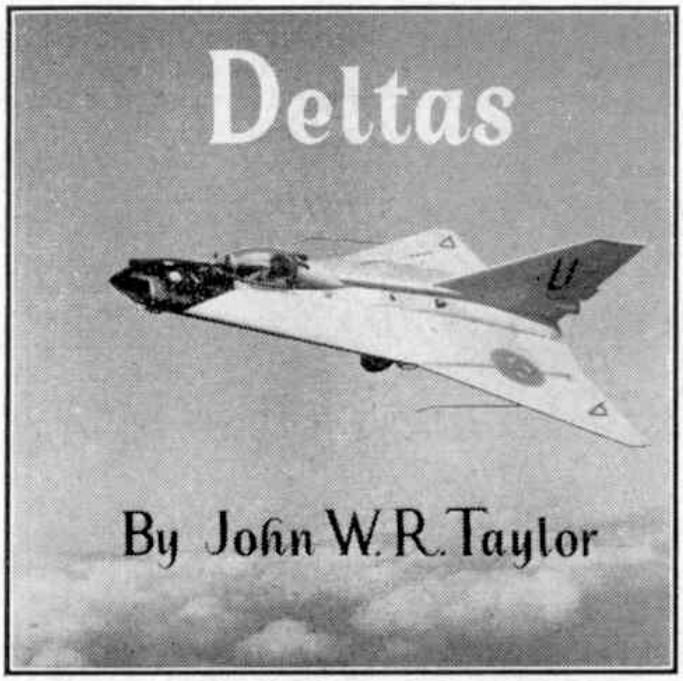


The little Saab 210 Draken "double delta" research aeroplane, one of the most advanced aircraft flying today. It has the same general layout as the revolutionary wartime designs of Alexander Lippisch. The Draken is powered by a British-built Armstrong Siddeley Adder turbojet, and has made well over 100 test flights to date. Photograph by courtesy of Svenska Aeroplan A.B., Sweden.

HISTORY books do not tell us who designed the first delta-wing aircraft. Perhaps it was the schoolboy who threw the first paper dart. But there is no possible doubt about who is setting the pace in delta design today.

At a time when there are only three or four of these fantastic "flying triangles" in the rest of the world, Britain has the giant Avro 698 bomber and Gloster Javelin fighter in production, the two-seat Avro 707 trainer on the way, and even more exciting deltas on the drawing board for the air forces and airlines of tomorrow.

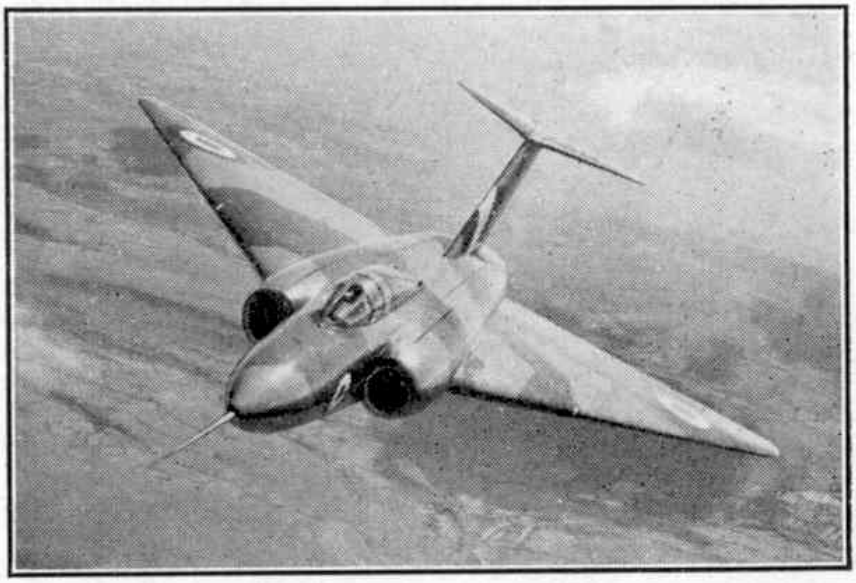
The word "delta" itself is, of course, older than the earliest legends of human flight, for it is the name of the Greek letter D, part of the language of those first mythical bird-men, Daedalus and Icarus. The Greeks wrote their capital D's like this—Δ—so when aircraft designers started making wings of that shape they remembered the Greeks had a word for it and called them deltas.

Even if we ignore the schoolboy's simple paper dart, aircraft with delta wings are at least 85 years old, because two Englishmen named Butler and Edwards designed one in 1867. What is more, it was intended to be jet-propelled, by a lightweight steam engine. But it was only one of a vast number of strange aeronautical shapes produced in the 19th century, and was no more successful than most others.

J. W. Dunne achieved much more in 1909. Probably few readers of *M.M.* will have heard of this great British pioneer, which is a pity because he not only wrote one of the most fascinating books of our age, called *An Experiment with Time*, but also solved a problem that cost the lives of scores of early aviators—how to make an aeroplane fly straight and level.

By 1909 it was becoming comparatively easy to get off the ground in a stick-and-string aeroplane. It was much more difficult to get down again in one piece, because few early machines were stable in the air. Even when there was little or no wind, they wanted to drop a wing, or suddenly stick their nose up or down for no apparent reason.

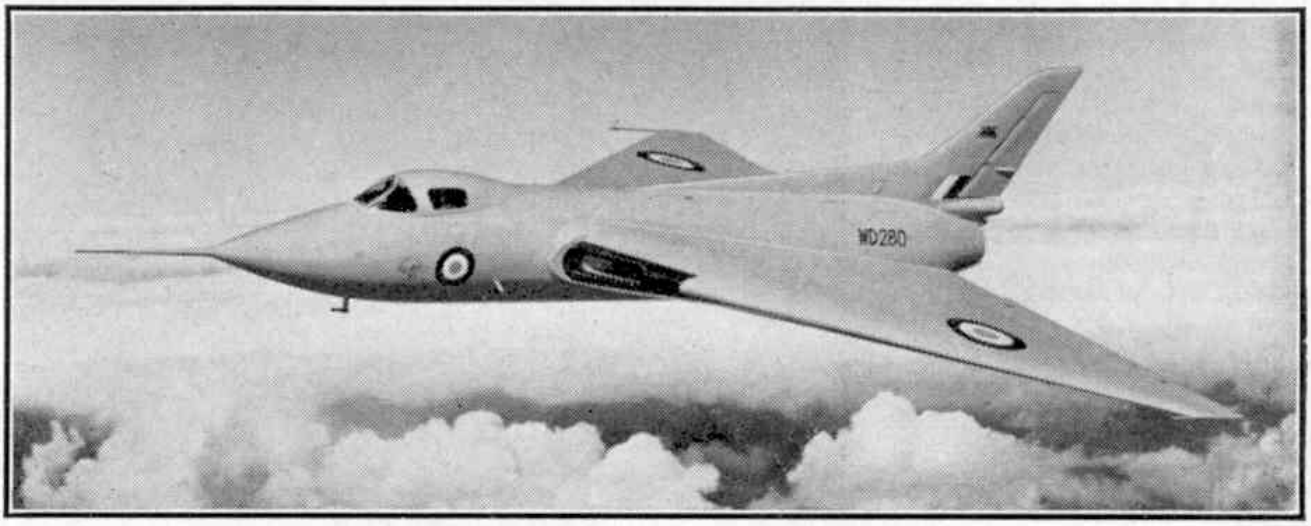
Dunne believed the answer was to build a tailless aeroplane—not quite a delta, but a sharply sweptback V-shaped wing. In 1907 he flew successfully a glider of this type. Two years later, at Blair Atholl in Scotland, his D.3 powered biplane made its first flight. By 1914, Dunne's tailless aircraft were flying so well that when the engine of one of them stopped over the Channel, its pilot locked the controls, hopped out of the cockpit on to the wing,



A striking view of the Gloster Javelin two-seat delta fighter. Photograph by courtesy of the Hawker Siddeley Group Ltd.

went and fixed an ignition lead that had dropped off the pusher engine, and then clambered back and resumed his flight.

Unfortunately Dunne was too successful, because when the 1914–18 war started a few months later, fighter pilots needed 'planes like the Sopwith Camel that could be whipped over quickly on to the tail of an enemy scout, or out of the way of a stream of hostile lead. An aeroplane whose sole ambition in life was to fly straight and level was a sitting target. So Dunne's tailless aircraft went the sad way of many good ideas until, in the middle of the second World War, nearly 30 years later, a frightening new "enemy" was discovered that could tear the tail off an aeroplane in a fraction of a second.



Avro 707A research aircraft. Photograph by courtesy of A. V. Roe and Co. Ltd.

The experts called it "compressibility," and it killed a lot of our best pilots before we found ways of combating it. It is not beaten even yet—the tragic death of John Derry at Farnborough proved how much we still have to learn about the problems of very high speed flight.

In simple language, what happens is that as an aeroplane approaches the speed of sound (760 m.p.h. at sea level: 660 m.p.h. at 30,000 ft.), the air in front of it is so compressed by its wing that it becomes virtually solid, forming shock waves that batter the wings and tail. (If you get a chance to see the fine new film *Sound Barrier*, do so, because it illustrates this very well).

Shock wave trouble can start long before the 'plane itself reaches the speed of sound, because airflow is speeded up as it passes over the curved wings and might reach sonic speed at a time when the aircraft is flying at only, say, 550 m.p.h. The thicker the wing, the further the air has to travel round it and the faster it speeds up, which explains why one of the first British aircraft to run into serious compressibility trouble in high-speed dives was the thick-winged Hawker Typhoon fighter, in 1942.

Its designer, Sydney Camm, realised what was happening, and quickly designed the thin-wing Tempest, which was able to fly 30 m.p.h. faster than the Typhoon without danger.

At about the same time, wind tunnel tests began to show that still higher speeds were possible in complete safety if wings were also swept back. This discovery could not have come at a more opportune moment, because the first jet fighters were going into production in both Britain and Germany, offering power and speed far beyond those of piston-engined aircraft.

British designers considered the aerodynamic advantages of sweepback did not justify the structural problems involved, so the Meteor and Vampire were given straight wings. But in Germany an incredible series of warplanes began to take shape, ranging from fairly orthodox twin-jet fighters to vertical take-off rocket interceptors and guided missiles, and many of them had V-shaped wings just like Dunne's old biplanes.

One of them, the projected sweptwing Messerschmitt P.1101, was so advanced that some of the most interesting European and American jets of the present day bear a family likeness to it that seems more than mere coincidence. But most startling of all were the designs of Alexander Lippisch, who believed that if wings had to be swept back, they might just as well be merged with the tail to form a delta. The result is a stronger structure, able to fly at very

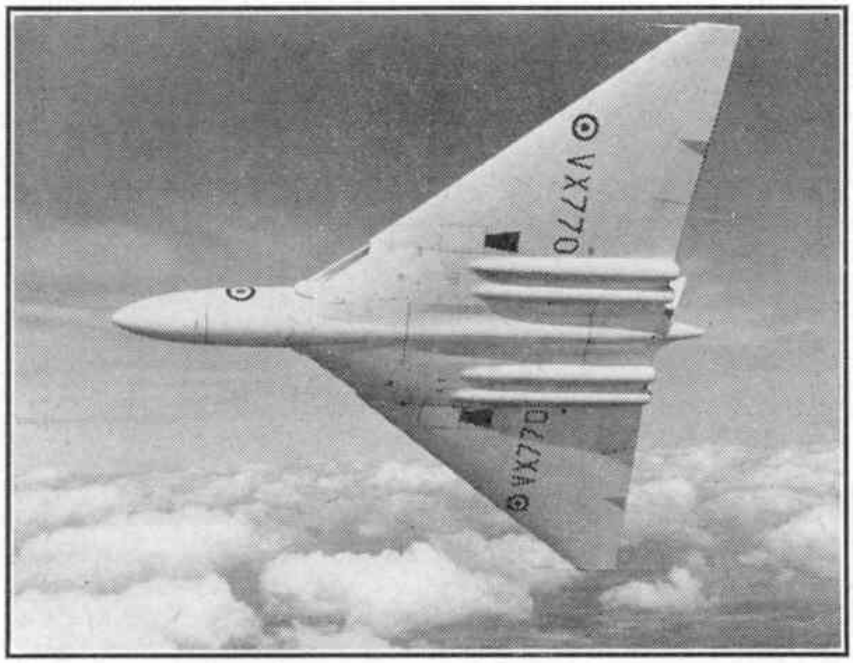
high speeds without danger. Its chord is so great that, even if it is comparatively thin in section, there is still a vast amount of room inside it for fuel, guns and equipment. In addition a delta combines big wing area with short span, offering exceptional manoeuvrability at high speeds and good handling qualities at low speeds. In fact, it seems to offer unlimited benefits at the cost of only one disadvantage—it is virtually impossible to pull out of a spin.

Lippisch's deltas were weird-looking machines with no fuselage, just a deep wing with a hole in the nose, cockpit in the middle and big vertical fin. The ramjet engines with which he proposed to power them were even more remarkable, one being no more than a block of white-hot carbon in a venturi tube! Fortunately the war ended before he had time to build them, and the first powered delta to fly, in September 1948, was Convair's XF-92, which was illustrated in the June 1952 *M.M.*

One year later, the Avro 707 appeared, and crashed within a month of its first flight. To their credit, Avro persevered with the design, built the Avro 707B with a longer nose, and engaged a test pilot named Roly Falk to fly it. They could have found no braver or more skilful test pilot, and Falk soon proved that there was little wrong with the 707's basic design. In fact he claims that it is no harder to fly than any other aircraft, and the fact that it has quite normal ailerons and elevators in the trailing edge of its wing means that a pilot handling a 707 for the first time would find its controls no different to aircraft he had been flying for years.

The Avro 707B, which flew on 6th September, 1950, has the air intake for its Derwent engine on top of its fuselage. The 707A, completed ten months later, is almost identical except that the intakes have been moved into the leading edge of its wings. A rumour spread quickly that it was a flying scale model for a big delta bomber, and the rumour became fact at the S.B.A.C. Display this year when hundreds of thousands of people saw the giant Avro 698 delta bomber fly gracefully overhead, very fast and very low, with the two small 707s racing along beside it. Most incredible aspect of the whole business was that Roly Falk was alone in the 698, proving its flying qualities so good that it can be handled perfectly well without any of the usual flight engineers, co-pilots, navigators and radio operators who ease the pilot's burden in such large aeroplanes.

Avro claim that the 698, which has four Avon turbojets, will carry more bombs farther, faster, higher and more economically than anything else in its class. They add that a civil air liner on the same general lines could, similarly, carry more passengers farther, faster and more cheaply than any other—for the delta is by no means useful only for war.



Remarkable underneath view of the giant Avro 698 bomber, showing its delta form. Photograph by courtesy of Hawker Siddeley Group Ltd.

Nor is the Avro 698 the only British delta already in production. Side-by-side with it in the Royal Air Force in a few years' time will be Gloster Javelin two-seat delta fighters, powered by two tremendously-powerful Sapphire engines. First of a new line of semi-automatic interceptors, they will be guided to their target in all weathers by radar, and formidably armed with cannons and rockets to destroy their enemy. Their shape is very like that of the Avro deltas, but, being fighters, they have tailplanes to give them slight added manoeuvrability that might make all the difference in combat.

Meanwhile, the Avro 707 is being developed into a side-by-side two-seat delta trainer, and (*Continued on page 592*)

Christmas in a Land of Sunshine—

(*Continued from page 539*)

jollity. Riverside and bush picnics have become more popular in recent years, possibly because of the shade that is sadly lacking at some of the beaches, but is so much needed as a protection against sunburn!

As many workers as possible take their annual holidays at Christmas. They like to be at resorts when everyone else is there and there's a crowd of holiday makers with one end in view—a good time. As New Zealand is such a narrow land there's a beach within easy reach of everyone, and they are scattered all round the coast, wherever there is a road of even slight accessibility.

But not all New Zealanders like crowded beaches and noise. There are those who prefer the quiet and peace of the sand and trees when no man disturbs what nature provides, those who like to hear the bird song across the still waters of the lake. Since the wonderful climate permits holidaying for so many months of the year it is always possible to find the quiet or the crowd, just as you will.

Deltas—(*Continued from page 542*)

both Boulton Paul and Fairey have flown high-speed research deltas that may well pave the way for even more revolutionary military designs. With these aircraft, Britain has shown that the delta is the shape of the future, offering unrivalled performance, yet docile enough to be flown by any average Service pilot. Together with our splendid jet-powered air liners, they have proved the British aircraft industry second-to-none in the world in design ability and the courage to develop revolutionary ideas into superb, highly practical aeroplanes.

On the Road—(*Continued from page 545*)

Wolseley—the 4/44, with an engine of 1¼-litre rating and developing 46 b.h.p. at power-peak. Armstrong Siddeley emerged from a long period of solid but rather unexciting production with the new, sleek Sapphire, a 3½-litre with fashionable looks and a high performance.

Last minute surprises were a new Healey, in the super-sporting class with Ferrari-type body and Austin A90 engine, a Frazer-Nash with similar power unit, a new Triumph sports with Vanguard engine, and a Rolls-Royce with automatic gearbox.

In the technical field, there is little doubt that the outstanding thing at both shows was the new disc brake. Both Girling and Lockheed are now developing this. It is so simple a device that the model-maker will be quite unable to resist it. Just a metal disc with horse-shoe member and friction pads to grip the edge, that's all . . . I think the present type of brake will be on its way out in a few years.

I have no space left for general topics this time. But I would like to honour the memory of John Cobb, before I close. Meeting him, one would have thought he was the typical quiet, rather shy, but calm and confident business man who has settled down to a "comfortable" existence. Many of us knew better. He was a man with that remarkable spirit of adventure —it is the only word—which finds a welcome place in a new Elizabethan Age.

Homelands of Christmas Customs—

(*Continued from page 573*)

whose birthplace was the old world minster town of Southwell, between Nottingham and Newark. His uncle was organist at Southwell Minster, and young Reginald was adopted by him. During his musical career, the composer was pianist at Covent Garden, London, and a tablet at Brompton (where he died in 1827) is in memory of him.

Even mere legends give Christmas romance to some English towns and villages. Near Guildford, in Surrey, is the oddly-named hamlet of Christmas Pie. The signpost pointing to it has been photographed many times, but how the place got its name is not generally known.

The story goes that a poor farmer and his family once lived at a farmstead in the vicinity, and one Christmas their larder was almost bare. But the farmer's wife gathered a few roots from the garden and put them in a dish in the oven. When the dish was removed it was found to contain a succulent pie of pork, rabbit, onions, and potatoes, and a Happy Christmas was the result. To commemorate this miracle, it is said, the place was called Christmas Pie.

SOLUTIONS TO FIRESIDE PUZZLES

The articles on our Christmas tree are crackers, chocolate, skittles, paints, stockings, balloons, a bicycle, an engine, a ball and a doll.

The town seen through the magic lenses is Knaresborough. The places in the square puzzle following are Ramsgate, Redditch, Brighton, Rhosneigr, Edinburgh, Filey and Leeds.

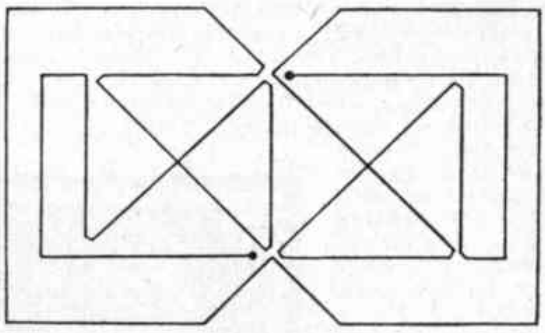
The accompanying diagrams give the solutions of the crossword and the Policeman's Beat puzzle, the latter turned on its side.

What is in the lorry load is discovered by holding the picture horizontally at eye level; Chocolate and Cream can then be read and on turning the paper round Pineapple is seen.

The word diamond is made up of the five words Tar, Taper, Captain, Realm and Rim.

But what about the station puzzle? Clearly the answer is Kings Cross.

The number of rings in our final puzzle is 37. At least, that is what we think. Can you find any more?



OUR COVER

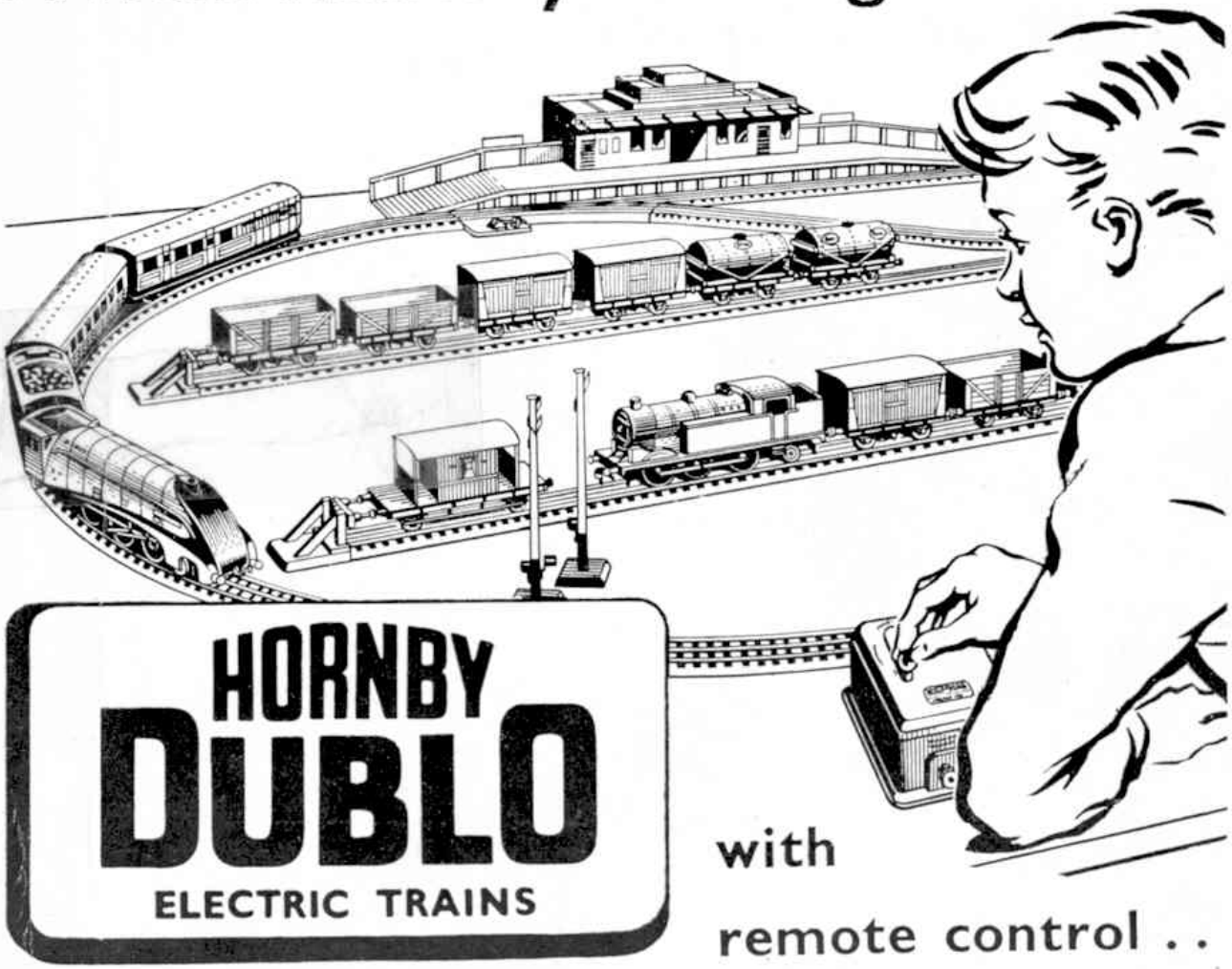
This month's cover suggests a land where Christmas weather is of the kind that we read about in stories. It is based on a photograph taken in Switzerland for which we are indebted to the Swiss National Tourist Office.

BINDERS FOR YOUR MAGAZINES

A new form of binder to hold 12 copies of the "*M.M.*" is now available. In it Magazines are held in position by metal strips passed through the stapling and slotted into the cover. The Magazines open out flat and are easily read.

The cost of the binder, which has the name in gilt on the front and spine, is 8/– post free.

A Real Railway Throughout



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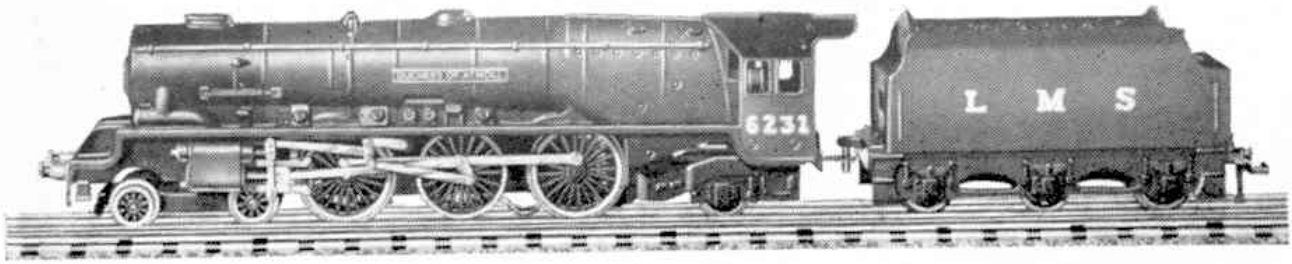
ELECTRIC TRAINS

with remote control . . .

Model railway realism triumphs in Hornby-Dublo. Every locomotive, every piece of rolling stock, and every accessory is built to scale, and a busy, realistic railway system can be set up on any large table. And at a touch of the control handle, it comes to life!



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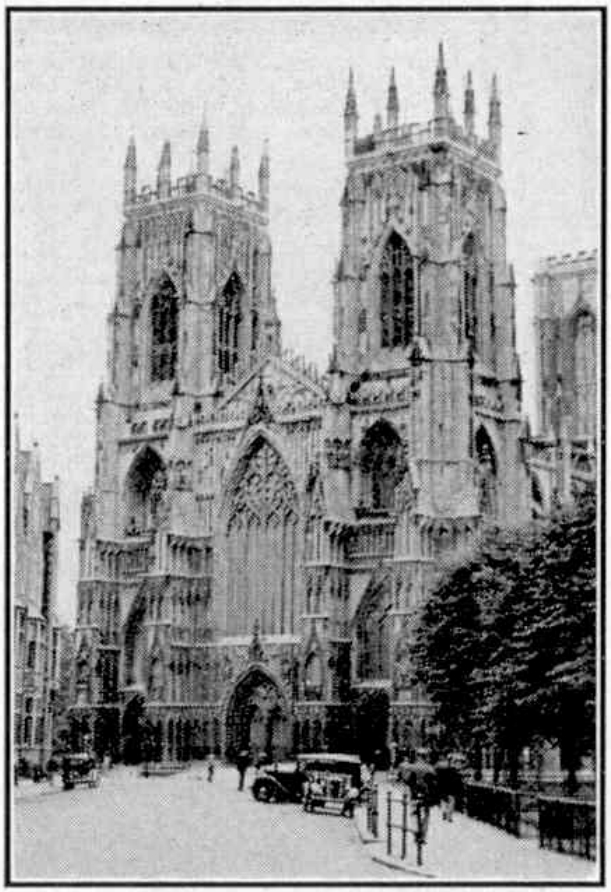
Homelands of Christmas Customs

By Arthur Gaunt

NO annual festival has a greater variety of customs attached to it than Christmas, for the season of goodwill is celebrated in many ways, from carol singing to the eating of roast turkey, and from fireside gatherings round the Yule Log to the giving of presents.

It is entertaining to try and discover just how — and particularly *where* — these traditional customs began. The touring cyclist especially might profitably make a note of these spots, with the idea of visiting some of them at a better time of the year.

The ancient city of York, one of the best-preserved historic places in Europe, can claim to have originated our Christmas celebrations in this country. Christmas Day was marked there in the year 627 by King Edwin and his court, to celebrate the monarch's conversion to Christianity by Paulinus. The event took place on the site of the present York Minster, in a tiny wooden church built by Edwin.



The first Christmas celebrations in Britain are believed to have been held on the site of York Minster, the great west front of which is shown in this picture.

The Minster as it stands today dates from the 13th century, but a custom connected with the earliest church here is still observed at Christmas. Each Christmas Eve a quantity of mistletoe, originally a symbol of heathenism, is carried into the Minster as a reminder that the great edifice was originally founded to oust Druidism, mistletoe having figured largely in the pagan rites of the Druids 1,300 years ago. The plant was also used in witchcraft at that time.

Yorkshire comes prominently into the story of Christmas feasting, too. Henry the Third and his court held a mammoth banquet at York on one occasion, the event being also a marriage feast. In the Middle Ages, indeed, Christmas feasting was often a big and long-drawn-out affair when "open house" was the rule for at least three weeks. The great barons threw open their castles to all who cared to come, and huge quantities of food were consumed.

The biggest banquet ever held in Britain was probably one that took place at Cawood Castle, near Selby, in connection with the Christmas festivities there in 1465. Guests flocked to the locality for the occasion, and nobody who cared to attend was turned away. The feast lasted for days, and it is recorded that 104 oxen, six wild bulls, 1,100 sheep, 304 calves, and 301 wild boars were eaten, in addition to thousands of pigeons, geese, poultry, rabbits, and pheasants!

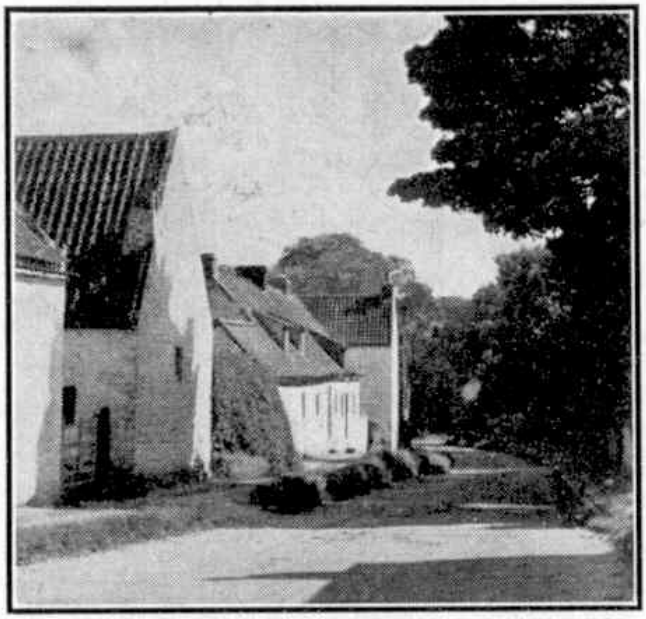
The remains of Cawood Castle can still be seen. The main surviving part is the fine old gatehouse, on which are carved various crests.

The list of dishes just quoted includes several items that do not appear on our Christmas menus today. Pigeons, for instance, are not a Yuletide dish nowadays, but many links with the time when such birds were specially kept for the table can be seen up and down England in the form of old pigeon cotes.

The cotes were built to provide nesting-places for wild pigeons, the birds being caught and used for food as required, especially in winter, when other fresh

meat was scarce. One of the oldest pigeon cotes in the country is just outside the churchyard at Sibthorpe, Notts. Another is on the village green at Clifton, near Nottingham, and the inner walls are fitted with no fewer than 2,300 nesting-boxes.

Our Christmas turkey is of more recent origin, the bird being unknown in Britain until Tudor times. Before that period the main dish was often a swan or cygnet, which was cooked and then made to appear as lifelike as possible before being placed on the table. It was cooked whole and the feathers were replaced, and often the beak was gilded!



Yorkshire also claims that it was the home of the first turkeys brought to England. This was the work of a youth of the village of Boynton, nr. Driffield, shown in this illustration, who went to the New World with Cabot.

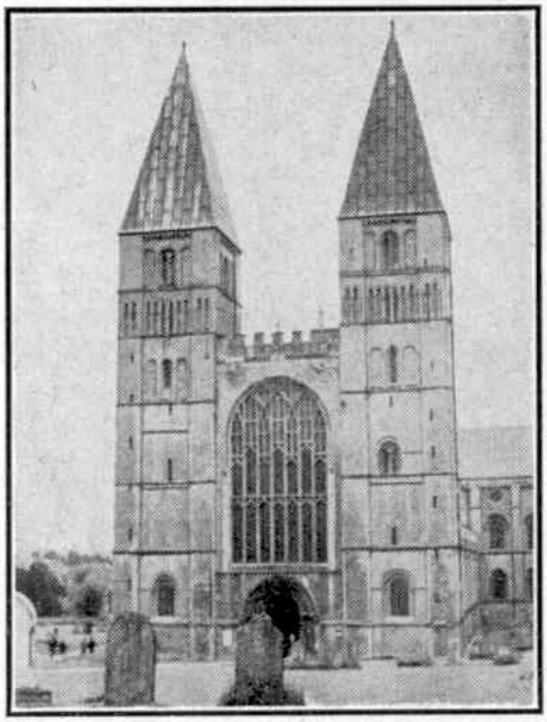
Boynton, a hamlet near Driffield and Bridlington, may be regarded as the "birthplace" of the traditional Christmas turkey. From this place went a youth called William Strickland, to serve as cabin boy aboard the ship of Sebastian Cabot the explorer. When the expedition returned, young Strickland brought back to Boynton a few turkeys which he had caught alive in the New World. These he carefully reared, and they became popular as a delicacy. They were, in fact, the first turkeys seen in Britain.

Later, William Strickland became prosperous and he designed a coat of arms for his family. It showed a turkey, and the crest is still used by the Stricklands of Boynton. Another reminder of the connection between Boynton and our Christmas dinner is in Boynton Church, the lectern taking the form of a turkey with outspread wings.

As to our Christmas hymns and music, one of the best known is *Christians, awake,* and several places are associated with this popular hymn. The verses were written by John Byrom, more than 200 years ago, and his quaint black-and-white house (known as Kersal Cell) is at Salford, Lancs.

The composer of the tune, John Wainwright, was organist at Stockport parish church and was buried there. A few bars of the tune are inscribed on his memorial. An oddity in the churchyard is part of his tombstone, for it wrongly states that he was buried just outside the church.

This stone has had a curious history, too. When the church was being restored, many years ago, gunpowder had to be used to demolish part of it. The explosion shattered several tombstones nearby, including John Wainwright's, and these were taken away as rubble. The composer's stone was lost for a long time, but it eventually turned up in a garden, where it was being used as a step. It was not quite complete, but the portion found in the garden was returned to the parish churchyard. It can now be seen there set into the ground a few feet from the church tower.



The twin towers of Southwell Minster. This building is associated with the name of the composer of the carol "Hail, Smiling Morn."

Hail, Smiling Morn is another popular Christmas tune, and it was composed by Reginald Spofforth,

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