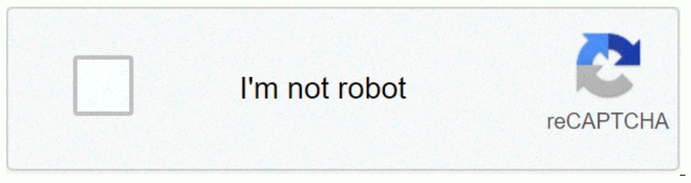

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Preserved 4-4-2 locomotive

GNR 4-4-2 No 251 (Ivatt Atlantic Large Boiler), 1984. Museum Group Collection © board of GNR Science Museum 4-4-2 No. 251 (Ivatt Atlantic Large Boiler), 2004. Museum Group Collection © board of GNR Science Museum 4-4-2 No. 251 (Ivatt Atlantic Large Boiler), 2004. Museum Group Collection © board of GNR Science Museum 4-4-2 No. 251 (Ivatt Atlantic Large Boiler), 2004. Museum Group Collection © board of GNR Science Museum 4-4-2 No. 251 (Ivatt Atlantic Large Boiler), 2004. The group collection preserves © of the Board of Directors of the GNR Science Museum 4-4-2 N0. 251 (Ivatt Atlantic). The group collection preserves © of the Board of Directors of the GNR Science Museum 4-4-2 N0. 251 (Ivatt Atlantic). The museum group collection © the board of directors of the Science Museum Let's end our look at the Whyte System. As a reminder, the first number is bearing, the wheel is unpowered in front, the next number is the supported wheels, the combination in the middle and the last number is bearing, the wheel is unpowered at the rear. The symbols sometimes have names and the last time we looked at things like Branchliners, Bourbonnais and Olomanas. These captions can be quite small. For example, Stephenson's Missile can be described as 0-2-2. There are no wheels in front, 2 driving wheels and then 2 bearing wheels at the rear. They can get pretty long too. LNER built a single example of the Garrett-type U1 class. This revelled in the wheel arrangement of 2-8-0+0-8-2. The Garrett type is an engine that has a single large boiler mounted on what is up to two separate mandest frames with their own wheels, cylinders and motions. For added fun, there were engines with wheel arrangements as exotic as the 2-8-8-8-4 (three sets of wheels combined – only one was the Virginian Railroad XA Class No. 700 in 1916). Any engine with 3 sets of driving wheels can be called a Triplex. There's also the excellent Johnston 16-wheel-drive mano starting train from New Zealand logging rail. This can be considered 2-2-2-2-2-2-2-2s or 2-2+2-2+2-2-2s. With that, back to the GWS collection. 2-6-2 (No. 5572, 4144, 6106): All didcot 2-6-2s are actually 2-6-2Ts (sub-tank engines). This is quite typical of wheel arrangements in Europe but those in the US are usually tender train trailers (towing a separate car to hold coal and water). The first American 2-6-2s were built in 1900 by Brooks Locomotive Works for the Chicago, Burlington and Quincey Railroad. These engines were mainly used in services at the Great Midwestern Prairies which led to the Prairie name for this wheel arrangement. It is one of the U.S. names commonly used in 2-6-0 (Number 5322): This is one of the most commonly used wheel arrangement names in the UK. The name Mogul used has an uncertain origin. Some people will tell you that it came from an engine called Mogul built for New Jersey's central railroad by the Taunton Railroad Manufacturing Company in 1886. However, there was a request for objections from the UNITED Kingdom for a Great Eastern Railway mandifier also known as the Mogul built by Neilson & Co in 1879. Regardless of where the name comes from, the first 2-6-0 tank engine was built around 1870 for the Garstang and Knott-End Railways. Now is a name! 4-4-2 (digitally 2999): Number 2999 Lady of Legend has been built in such a way that it can be converted into a 4-4-2 type. This is because GWR did the same with some of the originals as part of an experimental program in the early 20th century. The aircraft was first used on the 4-4-0 to allow for the installation of larger, wider fire boxes although this was not the case with the Saints. This type is commonly referred to as the Atlantic Ocean after the Atlantic City Line 4-4-2 railroads of Philadelphia and Reading Railways. They were also called Milwaukees after a quick 4-4-2 machine was used on the Milwaukee Railroad. 4-6-0 (No. 2999, 4079, 5051, 5900, 6023, 6998, 7808): This is one of GWR's favorites! There were Saints, Halls, Granges, Manors, Modified Halls, Counties, Stars, Castles and Kings and they were all 4-6-0s. Other railroads have also had a go at a few seemingly... Although the name is not used in the UK, americans use the name Ten Wheeler to describe 4-6-0. This is because there are ten wheels. Do I have to point that out? Maybe not... 2-8-0 (No. 3822, 4709, 5227): 2-8-0 is usually for freight. Nos. 3822 and 4709 are both tender engines but no. 5227 is a 2-8-0T engine or tank. The GWR 28XX class of which no. 3822 was the first British version to use the 2-8-0 and set the standard for heavy cargo locos in the UK until the end of steam (B.R. Class 9F 2-10-0 was the main exception). The American name for this type is a combination. The name comes from the 1866 Lehigh & Mahanoy Railroad 2-8-0 machine called Consolidation. It was the first 2-8-0 to have a separate horse truck for the front two rather than the top engineless wheels rigidly attached to the frame. 2-8-2 (No. 7202): The 2-8-2 design is relatively rare in the UK. A 2-8-2T engine or tank like the number 7202 is even rarer. However, they are quite common in other parts of the world. Class 72XX appeared rather luckier than judged but proved very successful. The first 2-8-2 wheeled 2-8-2 was built in 1884 and was called Calumet but the name did not stick. The last name that described the 2-8-2 loco loco loco loco loco locust - Mikado - was given after the Class locos for Japan's Nippon Railway by Baldwin Locomotive Works in 1897. The name comes from the famous opera Gilbert and Sullivan of the same name first performed in 1885. During World War II, the anti-Japanese feeling in america led to the wheel arrangement being renamed MacArthur after the famous general (despite the fact that the opera was British) but the old name returned after the war and is still in use today. Which leaves us with Railmotor number 93. Well, it's either a 0-4-0 if you just include the power bogie as a separate train head or a 0-4-4 if you include the trainer. Or maybe 0-4-0+4. Is the coach a gentle man? It brings coal and water to the engine after all. Does the fact that the coach wheels do not carry the weight of the train head means that we ignore them? If you include the coach then should it have the WT factor? The tank is under the coach's floor after all. The 'train head' is an integral part of coaching too. We'll leave that to you... FRIDAY 19 JUNE Is Everyone Whyte? Quite often the loco parts, like anything that has been around for some time use idioms and acronyms. Anyone who has ever watched or read anything related to space will know what we mean. There was once a proposed device called owl telescope (OverWhelmingly Large) that was sadly removed in favour of the smaller ELT design. We didn't make this up! Engineers who are really good at adding the kind of tools from the buzz and most popular to us at Didcot must be the Whyte Annoting System. Frederick Methven Whyte (they are not named as before?) is a Dutch/American engineer born in 1865. His idea was popularly used after a December 1900 editorial in the American Journal of Engineers and Railroads. While describing an engine as a 4-6-2 may sound complicated to uninitiated, it really isn't. A 4-6-2 engine would have four engineless weight wheels in front of the engine. It will then have 6 electric wheels either combined or driven in the middle, followed by two wheels bearing no engine weight in the rear. It is important to realize that you only cover the wheels on the train head, not on the tender (the car is out the back with coal and water in) if it has one. This is considered a separate and ignored means by the Whyte system. There is a list of added after-the-scenes to show different things, some of which we'll look at. There are also a variety of names used to describe the wheel arrangement (a 4-6-2 called a Pacific One), not all of which are commonly used in all parts of the world. It's mostly a But some of these names have been leaked into British use. Let's take a look at Didcot's collection. 2-2-2 (Firefly): The first 2-2-2 is an extended version of earlier 0-2-2 and 2-2-0 designs. The idea is that it has given you the opportunity to fit a bigger firebox. Any loco with only a control shaft can be called a single but the 2-2-2 design was also named Patentee after the engine was built by Stephenson in 1834 and it was later called jenny Lind Jenny Lind as a famous opera singer who had a 2-2-2 engine named after her in 1847. She is also known as 'Nightingale Sweden' which we think should be a name for an engine if it is not already there. 4-2-2 (Iron Duke): Another single. Also known as, wait for it, the kind of Iron Duke because of the GWR Iron Duke Class. Sometimes this wheel arrangement is called a bike too. You have to love that... 0-4-0 (No. 1, 5, 1338, 1340): When there are only wheels driving under one engine, the wheel arrangement is sometimes only called a [something] type combination, so a 0-4-0 is a Coupled 4 but this is not recognized exclusively. Sometimes the train head with different wheel arrangements with the same number of combined wheels is also known as 4, 6, 8, 10, 12 or (a Soviet example - it can not go round corner!) 14 combinations. It's a phrase that is used a lot of different ways. The first steamer - mechanically by Richard Trevithick in the early 19th century - was 0-4-0. This is where we start to get into the prime. No.5 Shannon is a 0-4-0WT. The tank engine carries coal and water supplies on the chassis of the train and does not use a separate tender. Where they carry their water is what makes the difference. WT stands for Well Tank and Shannon's water tank is located in the middle of her frame, underneath her boiler. It's said to be a well! No. 1 Bonnie Prince Charlie, 1338 and 1340 Trojan are all 0-4-0ST engines. ST stand for Saddle Tank and a look at the large circular saddle-shaped water tank atop their boiler will tell you why... 0-4-2 (No. 1466): Number 1466 is 0-4-2T. The T-factor means that any train head with a water tank does not hang the boiler, but is mounted on its sides. They can come in a variety of shapes and may have an additional water tank under the coal bunker at the back. Sometimes they are called extra tanks but to avoid confusion with saddle tanks, they only get a 'T'. The strange name sometimes used for a 0-4-2 is an Olomana. The name refers to a narrow gauge engine built in 1883 in america by Baldwin Locomotive Works of the same name. It was transferred to Hawaii and was only the third self-action machine to operate on the island. Its working life was spent at the Waimanalo Street Company and it was preserved as part of the Smithsonian Collection, which was owned and run at one point by Walt Disney animation house Ward Kimble. Walt Disney himself is a regular driver of the machine! 0-6-0 (No. 1363, 2409, 3650, As with 0-4-0, 0-6-0 is introduced as a Coupled 6 sometimes. The French have also been known to call them Bourbonnais as an early train engine to operate in their country and named after the region of France. With numbers 3650 and 3738, we get didcot's last element here with the most famous being 0-6-0PT. This means that Pannier Tank, 2 water tanks hanging on either side of the boiler which in the smaller manneconies, provides better access to woking parts between frames although there are additional reasons why GWR has also adopted it (see our blog post entitled The Big 13 – Lucky For Some). Nos 1363 and 2409 are both 0-6-0ST tanks or saddles. Diesel engines 0-6-0: Vehicles such as The Railcar No.22 and Gas Turbine Prototype No. 18000 are often not described using the Whyte system as they run on separate electric-powered marshes controlled by vehicles other than steam. The Whyte system applies to some of our other diesel locomotives. Typically, small shunting train heads look like their equivalent steam manometers. D stands for Diesel (the type of energy consumed by the drive motor) and the next letter shows the type of transmission. Therefore: Class 08 No. 08604 Phantom is a 0-6-0DE (Diesel Electric) No. DL 26 'The Rat' is a 0-6-0DM (Diesel Mechanical) Class 14 No. D9516 is a 0-6-0DH (Diesel hydraulic) 0-6-2 (no. 6697): This is a typical Welsh design – very suitable for storming up and down the valley roads they inhabit. There are two names associated with them. Branchliner refers to a series of U.S. train earlier motorcycles as 2-6-0 tenders with larger fire boxes equipped, requiring the bearing wheels to be moved from the front to the rear. They are mainly used for branch line work, hereby the name. Another name used, Webb, is in reference to British train designer Francis William Webb and his famous 'Coal Tank' class 0-6-2s. We'll leave the rest of the Collection for another time as this is getting pretty long enough now, so this is the first of an impressive 2 – part blog! A passing thought to end on. How do we classify our Wickham Trolley No. B42W? It has a gasoline-powered engine, driving a mechanical gearbox to the rear as PM. Sometimes small diesel locomotives only have their number of wheels cited so it can be No. B42W is a PM 4w. But, you can also describe it as a 2-2-0PM as having only two rear wheels controlled. Is it a train earlier? It can pull small trailers so that it can form a train. We'll leave you all to figure that out. Part two next week... FRIDAY, June 12, 1363 - Survivor Extraordinaire! We chat a little while back about the historical significance of 'Big Thirteen' (see Going Loco Archive) but what is fascinating the same is how this engine became preserved in the first place and it involves a lot more people than the person whose number 1363 seems to have cast its own spell. When she it has only taken 18,000 miles since the last overhaul. Her last official warehouse was Plymouth Laira and the staff there were somewhat infatuated with this small tank engine. She had a dent in her bunker where she had a 'disagreement' with a Hall Class motorcycle a few years back but to them it must have just added character! At the time only two saddle locos of the GWR Swindon tank survived. Number 1363 and her sister, number 1365 were dumped in Bristol but unfortunately it wasn't long. This fact did not go un heeded. Number 1363 has been stored out of use for quite some time. It was previously used as a regular loco for the Plymouth Millbay port area but now sits cold with an uncertain future. BR employees in Laira were ordered to clean up the warehouse of any remaining steam locos by sending them for dismantling. This is mostly 'County' engine class (getting one too would have made our current job a little easier!), formed a long line with 1363 at the top. It looks like the end. One last trip... The employees of the warehouse, including the warehouse manager, did their best to keep the number 1363 under their care. She was even maintained by them in her spare time. They were desperately looking for a bolt hole for her and they wouldn't let her go that easy. Unaware the crew had come to take her away, the warehouse staff had been busy the night before. At the suggestion of a man in the know, a few important items were removed. These are a few of the bolts that hold the front padded beam and articulate in place. Number 1363 was the last loco to be placed in the ship. The diesel combined up and went to pull away. The weight of the dead engine ship and the effort of the diesel engine did its terrible job. There is a sickening noise of tortured metal. The front padded beam was torn apart and the coupling was so badly damaged that it was impossible to pull the engine. You can imagine the conversation. Oh, man, there, there, don't worry. That seems inappropriate to travel ... Once the train went, the 1363 number was quickly squirrelled away in a corner of the roundhouse. Where is she? For about a year! While all this skulduggery happened, 4 schoolboys began a group to buy a 14XX Class train engine and its accompanying auto trailer coach. This is of course the beginning of the Great Western Society. At the 1963 AGM, it was suggested that perhaps society (those who have not yet purchased the number 1466 and coach No. 231) would be better served to lower its vision and try to get a smaller, cheaper manor than the first. The suggestion was made that number 1363 - due to its unique history - would be a much better bet. Finally, as we all know, that idea was rejected it sowed the seed of an idea in the mind of then-President Peter Lemar. He sees the need to preserve the train earlier along with his brother-in-law, Alan Edwards (a senior MOD engineer) arranged to inspect the train. Although it is necessary to remove ash from the last fire, the inspection shows that the train head is generally in excellent condition and with a little light metal (to the front padded beam!), will make a very sound prospect for preservation. Peter and his wife Joan set up a separate fund to buy the train and were able to raise money in a fairly short period of time. They actually ended up with offers of money that totaled almost double the asking price of the train. Therefore the train engine was purchased and became a preserved engine. The purchase was made privately so Peter was technically the right owner. There were a few people who were involved in the purchase so Peter and Joan gave them some options on how to proceed with her preservation, including those who advocated keeping the engine. The overwhelming result of this ballot was to donate number 1363 to become part of the Great Western Society collection and thus she became the second item of rolling stock owned by the Association, as soon as the number 1466 was purchased. When you hear how close this engine destruction has been many times, you realize just how lucky we are to have her. You also realize what a lottery preserve is and that it is often a cond condation of events that do not result in a rolling stock piece being saved. We have a lot to thank the first pioneers of steam conservation like Peter and Joan Lemar and these guys all those years ago in Laira who were very determined to save their shed pets! Peter is stuff in the preservation of several cars in the collection and buys some of them himself. It really is a tribute to people like him and all the other GWS trailblazers whose collection at Didcot is so wonderfully diverse and exciting. Although Peter died a few years ago, when we steam number 1363 again after his overhaul, we will no doubt pause to remember him and all the others who have done so much to ensure that this less attractive engine has been passed down to future generations. You can donate to our Small Train Foundation to support the restoration and maintenance of 1363 and other small tank engines at Didcot. FRIDAY 5 JUNE Under pressure Boiler steam train is a great bit of ministry. It uses all sorts of smart science to make steam so we thought we would delve into how one of these works. Mind your head on the way in... The first thing to say is that it is, like any machine, a device to convert one type of energy into another. In this case, we start with chemical energy bound in the coal itself and convert it into thermal energy. Chemical energy has put down former eons (the story of coal is for the geological experts to explain much better than us loco engineer!) and is released when a fire is applied to coal. In other words, let's burn it! In order for coal to burn more efficiently, it needs to have enough access to the air and there are two directions it can come from. Underneath through the grate or through the fire hole doors where firefighters put coal in. Adjusting the shock gates on the ash pan and the fire hole doors in the cab give firefighters a fairly precise control of the airflow into the fire. With a little course experience. All this takes place in a large metal box. With a fire in it. It's called firebox. We kind of train earlier than the complicated one... There are two walls here. The inside is made of copper on all our GWR machines. Then there is a space where water travels and this is heated by energy passing through the copper walls. Then there is an external firebox made of steel. On the front of this is a large-shaped barrel protuberance called barrels (again, not those capable of winning literary prizes). Inside here are several tubes. Most of these are fire tubes - hot gases from fire travel along their length. Water is outside this and is heated by the thermal energy that flows through them. Multi-tube boilers are one of the biggest improvements of the steam age. Really soon the steam engine has only one large, diameter tube for the hot gas from the flame to pass through. Not long after, it was realized that if you put some smaller diameter pipes in the boiler instead of a large one, you would increase the area of the hot surface that the water could come into contact with. This makes it more efficient - you get more useful energy from the coal you're burning. It was present on Stephenson's Rocket in 1829, on the original GWR Firefly class in 1840 and it was present when Swindon built the 9F Class 2-10-0 No. 92220 Evening Star in 1960 as the last major British steam boiler. A good idea is a good idea. There are a few really smart bits about how a manneer boiler works. Smart Bit No. 1: The harder you go chuff, the more air passes through the flames! That's right - steam comes out of the boiler, through the regulator (the steam engine is equivalent to an acceleration machine in a car) and is used in pistons. It then exhausts the chimney through a conical device called an explosion tube that increases the speed of steam as it passes through it. Remember the Venturi effect? This causes air pressure in the smoke box (black bits with doors on it in front of the boiler where smoke passes through, we do as simple names remember...) to be lowered. This makes the hot gases are pulled through the tubes in the boiler to heat the water that surrounds them. When doing this, it reduces the air pressure in the fire box, sucking fresh air into the fire that makes it burn The more powerful the engine, the more steam is needed and the more steam it generates. Well, that's convenient! Smart Bit Number 2: Firebox should really melt. Copper that all GWR fire can be made of can be a special type, slightly more heat-able (arsenic copper for those who must know) but it melts at 685 degrees C. (1265 degrees f.). The fire however burns a lot hotter and actually copper goes soft and therefore will lead to a catastrophic failure (also known as an explosion!) long before that temperature reaches. The pressure likes to get out and when you're dealing with up to 250psi (King Class), it REALLY does it very best to get rid of. So why not? Because physically! We have established that copper is not able to withstand large amounts

of thermal energy inside itself. However, IS is very good at moving that thermal energy from one place to another. It is an excellent thermal conductor. Water on the outside of the copper part of the firebox has a huge appetite for thermal energy. Ever wondered why heating a bathtub filled with water or water in your radiator takes so much energy? Water can absorb a huge amount of thermal energy. So copper takes thermal energy from the fire and conducts it through itself so that the water on the other side and water absorbs the thermal energy, keeps it cool and prevents it from melting. Simple! Smart Bit Number 3: The superheater. This is one of the 'two bites of the same type of cherry' type. If you have a big loco that's needed to make a lot of steam for a long period of time (say, Paddington to Bristol), every ounce of energy you can get to go to spin the wheel then the more efficient the loco loco locoth will be. So steam in the larger engines is released through the adjustable valve and instead of going straight into the cylinder it goes instead of back into the hot gas coming from the fire. This is where things get weird. We have to talk about moist and dry steam. It's all made of water - how can that be me hear you cry?! Ok - wet or saturated steam is things that go straight out of the boiler. Dry steam is also known as overheating steam and the big difference is the amount of energy bound inside it. Steam travels from the regulator, through super-hot headlines, into a series of smaller tubes called elements. This is inside larger fire tubes called vents. This is the second biting steam at the energy coming out of the fire. Steam Then comes out of the cylinder where the extra energy reduces the likelihood that it will cond condence in the cylinder, improving the efficiency of the engine. Think of it like a steam engine version of a turbocharger.* There are a lot of really smarter bits of engineering on a steam engine and its boiler, but instead of writing something that's 30,000 words long, we'll save more for another day. To be continued. * For some unknown reason, the small cover on the side of smokeboxes of some GWR engines seems to have collected the name 'including superheater'. Quite where this idea comes from is unknown, but the inclusion is there just to clean up the look of some oil pipelines. The superthermal system itself is WAY too big to fit them and completely contained inside the boiler and smoke box anyway. It doesn't need a cover-up. Going Loco - Latest Blog « Back To Going Loco Index