CANADIAN RAILROAD HISTORICAL ASSOCIATION

INCORPORATED.

MONTREAL, CANADA

NEWS REPORT #62 DECEMBER 1955

Notice of Meeting:

The December meeting will be held on Wednesday, December 14th, 1955 in room 920, Transportation Building, 159 Craig Street West, at 8:00 PM. Regular business will be transacted at this meeting. An interesting talk will be provided by Mr. Edward Thompson, Supervisor, Signal Dept., Canadian National Railways on the subject "Signalling in the Montreal Terminals of the C.N.R." Members and friends are cordially invited to attend.

Nominations for Elections at Annual Meeting in January

At the last Executive meeting, the Vice President, Mr.O.S.A. Lavallee, was appointed Chairman of the Nominating Committee for the election of officers for the year 1956. Notice is hereby given that nominations are to be given to the Chairman of the Nominating Committee before, or at the December meeting. All nominations must include the nominee's willingness to stand for the elections, and be moved and seconded by regular members in good standing. They may be mailed to Mr. Lavallee at P.O.Box 22, Station "B", Montreal 2, with the envelope marked "Private" - Election Nominations", or they may be given verbally to Mr.Lavallee by telephone at TA.8822.

Association News

Recently, while the contractors were excavating for the Saint Lawrence Seaway Canal offshore at St.Lambert, just downstream from the Victoria Bridge, the contractors uncovered a line of piles marking the site of the trestle, erected more than one hundred years ago, carrying the Montreal & Champlain Railway from the mainland, to the ferry wharf at Moffat's Island. This event was marked by a press and television interview of interested persons at the spot. Those present included Mr. Anthony Clegg, Treasurer of the Association, Mr. Louis Carrier, Curator of the Chateau de Ramezay, and officials of the Canadian National Railways.

Mr. Robert R. Brown, Chairman of the 1956 Canadian Railway Historical Exhibition committee, reports that arrangements have now been completed with the Chateau de Ramezay, and the opening and closing dates of the exhibition have been set at August 1st and September 20th, 1956, respectively. The exhibition, marking a number of railway anniversaries occurring in 1956, will include photographs, models, number plates, and other memorabilia of Canadian railways, and a working model railway display.

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VIII - "JUGGLING THE ASHLARS"

IN MOST CASES, the stones for the piers were delivered by barges and steam tugboats, of which there were 72 of the former and six of the latter. Many of the stones were very heavy, especially the ashlars, which weighed 10 to 15 tons.

On the piers built under Mr. Hodge's supervision, the stones were handled by travellers, the tops of which were 36 feet above water level. Two of the machines were elevated on staging, composed of bents on each side of the cofferdam, supporting two longitudinal caps or timbers on which were laid the rails for the travellers to move upon, and extended from the upper end of the pier to the lower end of the cofferdam, and projected sufficiently far over the end to permit one of the travellers going out beyond the cofferdam above the deck of the barge containing the stones.

The travellers were worked by manual labour and were provided with gearing so that they could be moved from one end of the cofferdam to the other. Each one had a strong "jennie" or small traveller, working laterally across the top and carrying the hand operated hoisting machinery. They worked reasonably well, but they were slow and it was back-breaking work for the men.

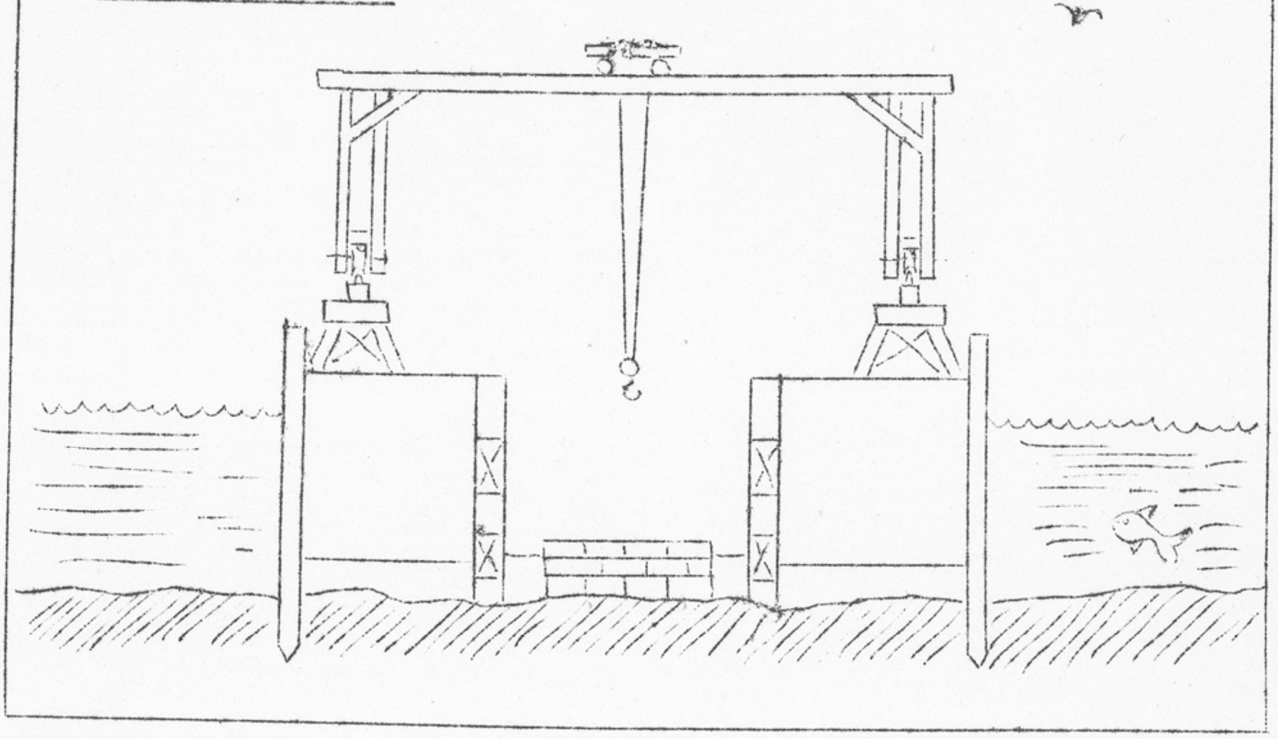
In this, as in other ways, the sub-contractors were more inclined to use labour-saving devices to offset the relatively high wages. Mr. Chaffey used derricks which were operated by a small steam engine and the mechanism was so ingenious that an intelligent boy could, by manipulating the levers, bring into play three of the six possible movements, either separately or at the same time.

The main part consisted of a mast, about 80 feet high, with an iron pivot at the base resting in a cast iron socket, and it was held securely in a vertical position by two wooden guys attached to an iron pin at the top of the mast, and the lower ends securely attached to the sides of the cofferdam. Thus arranged, and with the horizontal arms afterwards added, it could swing in an arc of 270° and could reach all parts of the work. The arms for supporting the travelling "jennie" were two long timbers, 8" x 14", bolted on each side of the mast. The long end, 64' long, carried the rails for the "jennie" and the shorter arm served for the truss rods introduced to stiffen the mast. The controls responded to the slightest touch, it worked very rapidly, and the heavy stones could be deposited in their proper places with amazing precision and it was, perhaps, the most remarkable and successful application of steam power, during the entire progress of the work.

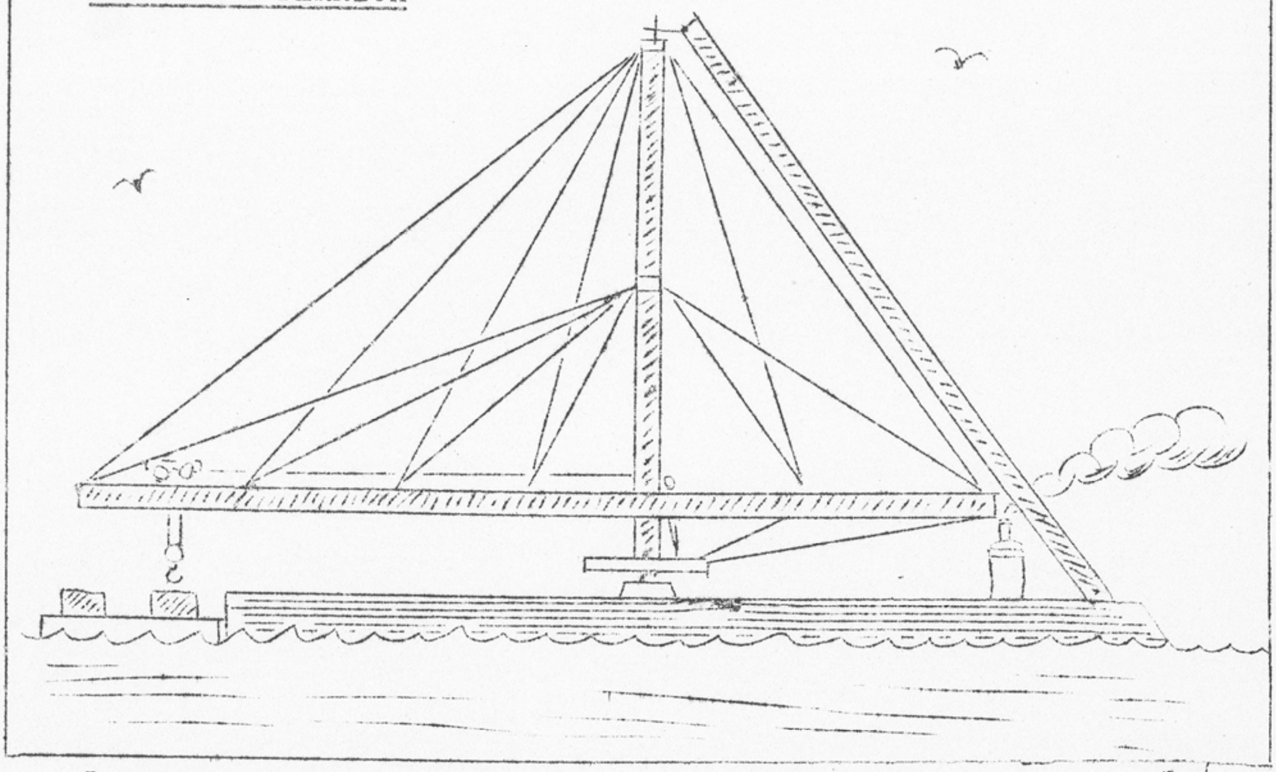
NOTE. Diagrams of the Traveller, and of the Derrick, appear on the next page.

VICTORIA BRIDGE - JUGGLING THE ASHLARS.

HODGES TRAVELLER



CHAFFEY'S DERRICK



Drawings not to scale, and not fully detailed.

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CANADIAN EXPERIMENTS IN AIR CONDITIONING

ONE OF MY EARLIEST experiences with air conditioning was an unfortunate one. Some years ago, when air-conditioned sleeping cars were still a novelty, I was riding in one between Montreal and Quebec when, some time in the small hours of the morning, the train side-swiped a family of skunks. The little 'bêtes puants' seemed to be annoyed, retaliating in the only way they knew, and in a matter of seconds, the delicate aroma was sucked into the air-conditioning system and disttributed in generous quantities all through the car. At first, I was filled with disgust -- "Who invented this crazy idea, anyway ? " --- but soon this changed to wonder as, in an incredibly short time, the incoming fresh air cleared the car and in a minute or two not a trace of the unpleasant odour remained.

by Robert R. Brown

The basic principles of modern air-conditioning are very ancient. They date back two thousand years to the hypocausts of ancient Rome, and to the inventions of Leonardo da Vinci, four hundred and fifty years ago. I was considerably astonished to learn, however, that what was probably the first practical application of air-conditioning to railway passenger cars was made in the Pointe St. Charles shops of the Grand Trunk Railway --- less than five miles from my own home !

In the early days in Canada, buildings of all kinds were heated very inefficiently by large open fireplaces, which were used also for cooking, but, in the first few decades of the nineteenth century, stoves began to appear, and soon their use was universal. Usually they were square boxes, of sheet or cast iron, designed to hold from two to four "junks" of birch or maple, and , while they undoubtedly kept the houses at a higher and more even temperature with less trouble, and they certainly improved the quality of the cooking, they did spoil the natural ventilation provided by the older fireplaces. With almost continuous cooking and frequent laundering, the result was a hot and excessively humid atmosphere, and a marked increase in the prevalence of respiratory ailments. This was particularly troublesome where large numbers of people were crowded together in relatively small rooms, as in schools, hospitals, barracks, offices, jails and similar buildings.

A little over a century ago, in the small town of Cobourg on the north shore of Lake Ontario a few miles east of Toronto, there lived one of those mechanical geniuses who couldn't mind his own business.

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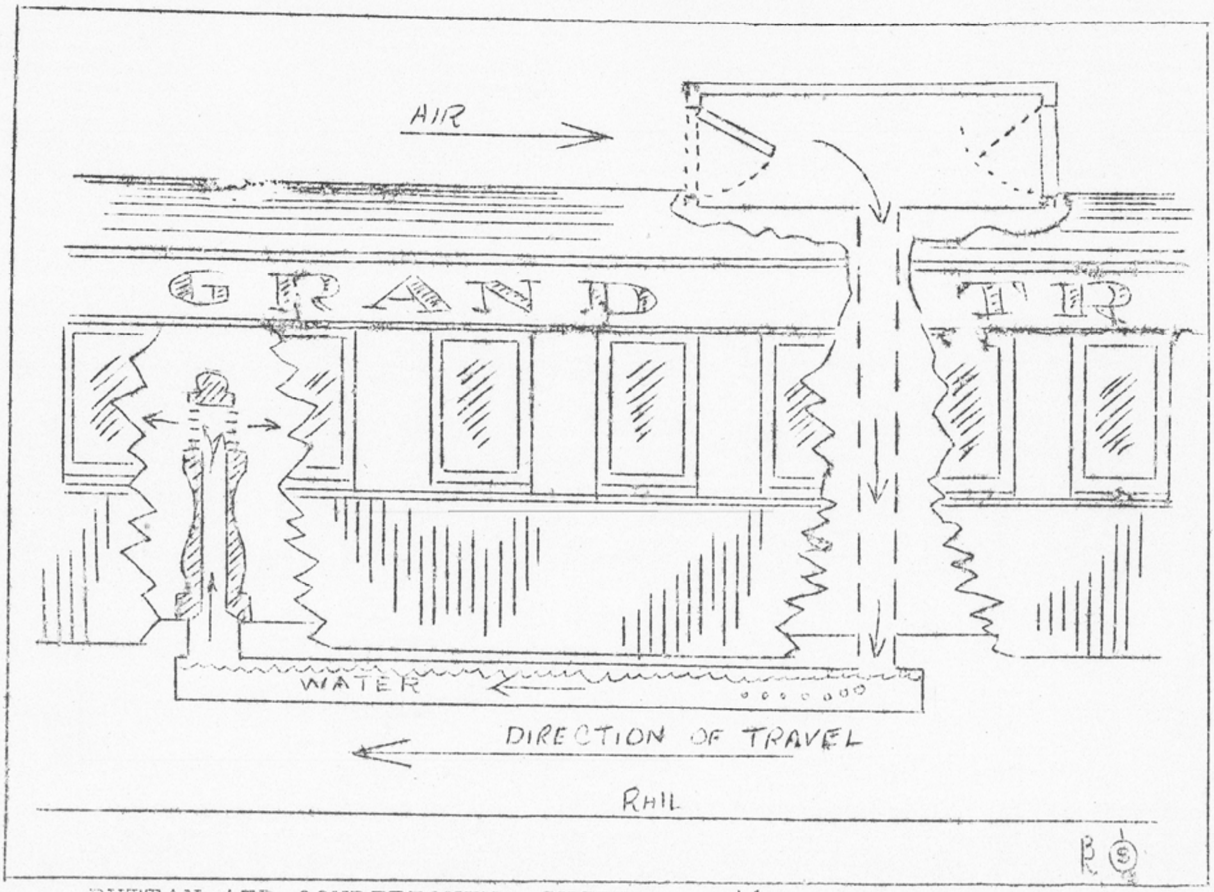
Henry Jones Ruttan was sheriff of Northumberland county and, as such, one of his duties was to see to the heating of the courthouse and jail. When the outside temperature dropped to 20° below zero, it was a difficult job to maintain a comfortable temperature inside with the primitive equipment available. He devoted a great deal of time and thought to the problem and, starting with the well-known but little understood fact that warm air rises and cold air falls, he



RUTTAN AIR CONDITIONING SYSTEM - 1860 - DIAGRAM

developed a system of heating whereby the cold air was drawn from the rooms at floor level, conveyed downward through ducts to the heating chamber of a furnace, where it was warmed and humidified, and then distributed upward through other ducts to all parts of the building. With the air circulating continuously, without any mechanical propulsion, the building was heated easily and efficiently, and even today the system is widely used in Canada. With a modern thermostat controlled oil burner, the hot air heating is far superior to steam or hot water systems.

For ventilation, Ruttan found that in a house inhabited by a family of average size, the occasional opening of a door or window provided enough new fresh air, but in schools and other buildings, containing many people, he found that the air had to be changed at fairly frequent intervals. Fresh air from the outside was admitted through adjustable registers, or simply by opening a window, and the vitiated air was drawn off through registers near ceiling level in each room, and conveyed upward through a ventilating shaft to create the partial vacuum needed to draw off the foul air. In winter time, the heat from the interior of the building was sufficient to create this suction but in milder weather, it was necessary to keep a small fire burning in the base of the shaft. In later years, mechanically-operated fans were used. The first school I attended, many years ago, was an old one heated and ventilated in this manner, and it was a much more comfortable building to be in than the ultra-modern steam-heated school which replaced it.

Sheriff Ruttan soon acquired a reputation as a heating and a ventilating expert, and, as his duties were not onerous, he was able to spend a great deal of time travelling all over Ontario, designing and supervising the installation of new units. From April or May to November, he travelled on steamboats which, even by today's standars were large and comfortable, and even luxurious, while, in winter, he used a horse and sleigh --- pleasant and comfortable even for fairly long distances. And then came the railways. The flat-roofed passenger cars, with hard and uncomfortable low-backed seats, were excessively hot in summer, filled with smoke and cinders from the locomotive and with dust from the sandy ballast, but in winter they were much worse. Those who managed to huddle around the little pot-bellied stove were nearly roasted while others, a few feet away, shivered in cold so severe that it would congeal the oil in the brakeman's lantern. So, on one of these uncomfortable train trips about 1856, Ruttan began to wonder if his system of heating and ventilating could be adapted to railway use. By 1859 he had made enough progress with his experiments to be able to persuade the Grand Trunk Railway to install his system in a special car then being built in the shops at Pointe St. Charles, Montreal, for the use of the Prince of Wales when he visited Canada the following year, and also in six other passenger cars.

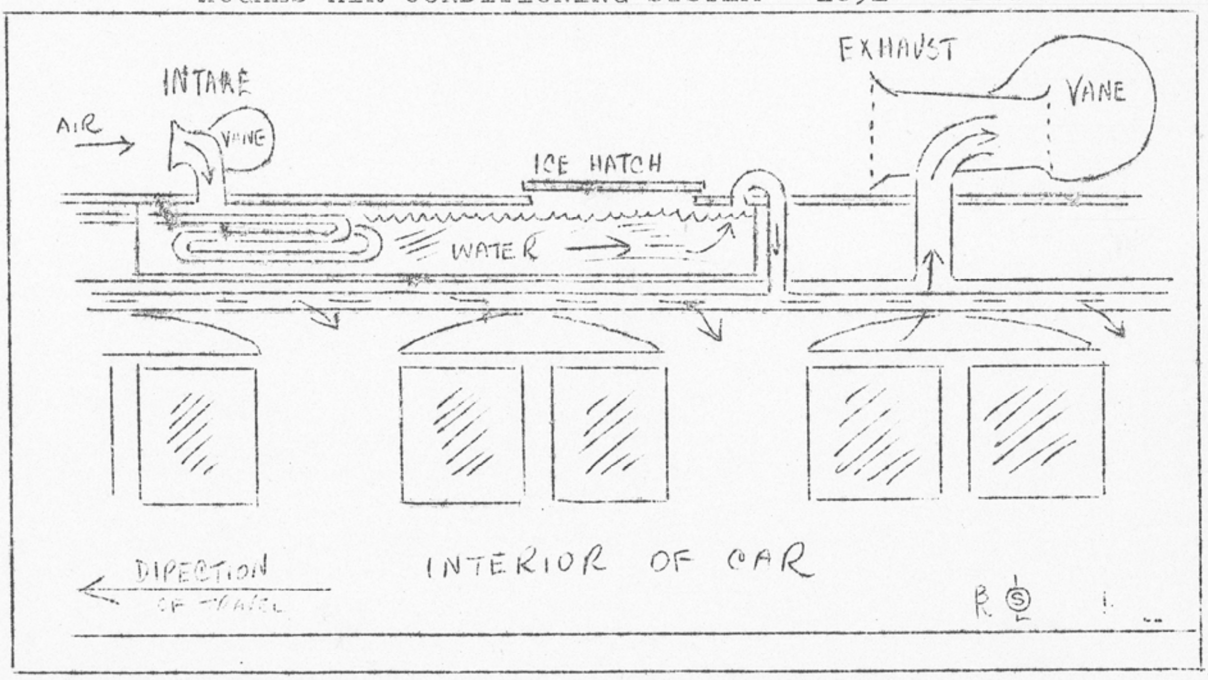
The Ruttan system was very simple; on the roof of the car, there was a square structure, about the same shape and size as the cupola of a conductors' van, which was called the 'receiving box'. There were two self-acting valves, or hinged doors, facing opposite ends of the car and, as the car moved in either direction, the breeze created by the movement of the train forced open the valve facing the front of the train, at the same time tightly closing the one facing the rear. This built-up air pressure in the receiving box which was sufficient to operate the whole ventilating system. Air was forced downward, from the receiving box, through ducts to one end of the wash tank which was suspended under the floor of the car. The tank was made of sheet iron; 16 feet long, 9 feet wide and 4 inches deep, and it was filled almost to the top with water, which was agitated by the motion of the car. The air, in passing from one end of the tank to the other, was cleansed of a surprisingly large amount of dirt; so much so that the tank had to be cleaned out at frequent intervals. Also, since the tank was sheltered from the rays of the sun by the car body, and was exposed to the breeze caused by the movement of the train, the temperature of the air passing through the wash tank was lowered by 5° or more. Thus the air delivered to the interior of the car was cleansed, humidified and cooled. From the tank, the air was forced upward, by the pressure from the receiving box, into two ornamental pedestals or columns, called 'dischargers', and escaped through grills about 6 feet above floor level. It was not thought necessary to keep the windows tightly closed because the air pressure built up inside the car was sufficient to prevent the admission of air, dust and cinders. The foul air excaped through adjustable grills and was carried through ducts to exhausting vents on the roof.

Although the system worked remarkably well, and was regarded at the time as a marvellous invention, it did have one serious defect. A strong tail wind or a side wind would reduce the efficiency of the system and, of course, when the train stopped,the circulation of air ceased too. This fault was partially corrected some years later by the Great Western Railway of Canada which built receiving boxes of sheet metal and mounted them on the roof in such a way that they would revolved on a vertical axis. Suitable vanes were attached to the boxes so that they always faced the wind and, with this improvement, if a breeze was blowing at all, the circulation of air continued even when the train stopped.

In wihtertime, the water was drained from the wash tank and the dischargers inside the car were removed. One duct was closed and a hot air stoves was placed over the other. The air was forced upward from the empty tank into the stove, where it was heated, and then it was discharged through a duct along one side of the car, at floor level, with apertures under each seat.

At an average speed of 40 miles per hour, it was estimated that in summer the air in the car was changed every two minutes, while in winter, with one duct closed and the air passing through the heating system, it was changed every six minutes. The fost of installing the Ruttan system was only $60.00 per car, but apparently the railway officials concluded that the results obtained did not justify even that moderate expenditure and no further experiments were made on Canadian railways for many years. It is possible too that passengers objected to swirling currents of air inside the car. Ruttan then made arrangements with a number of American railroads to experimmnt with his system of ventilation. Trials were made by the New York Central, Erie, Boston & Lowell, Philadelphia Wilmington & Baltimore and several other roads, but the results were not entirely satisfactory and railroad officials lost interest. In the Peale Museum, in Baltimore, there is a model of a Boston & Lowell coach, equipped with the Ruttan ventilating system

HUGHES AIR CONDITIONING SYSTEM - 1891 - DIAGRAM



and presumably he made use of it when he was trying to arouse the interest of officials of the Philadelphia, Washington & Baltimore RR.

A number of other inventors tried to develop satisfactory air-conditioning units for passenger cars and some of them were fairly efficient but the inventors found it impossible to overcome the inertia of the official mind. Among the subsequent inventors was Major Sam Hughes of Lindsay, Ont., whose system was tested on the Intercolonial Railway in 1891. Sam Hughes is almost completely forgotten today but he was a distinguished soldier and, as Minister of Militia in the Borden government during the first two years of World War I, he was instrumental in converting the Canadian militia, which had been little more than an elite and rather picturesque social and athletic club, into an efficient fighting machine which even the German army soon learned to fear and respect. The Hughes ventilating system differed radically from the earlier Ruttan invention, in which pressure was built up which forced fresh air into the car and the vitiated air was allowed to escape. In the Hughes system, an exhausting ventilator created a partial vacuum which drew the vitiated air out of the car and fresh air rushed in to replaced it. This, of course, is an oversimplification. Fresh air entered the car from above through a trumpet-shaped funnel, like those used on ships, and then passed over water in a tank, there depositing dust and cinders; thence, it passed into the car. In hot summer weather, the water in the tank was cooled by blocks of ice put in at frequent intervals while in winter the air was heated by exhaust steam from the locomotive circulating through coils of pipe immersed in the water of the tank. The air was distributed along each side of the car, at ceiling level, in pipes each having a continuous narrow slot opening, thus obviating the unpleasant drafts. A similar arrangement was designed to ventilate the lower and upper berths of sleeping cars, with individual controls for each berth. The heart of the Hughes system was a specially designed exhausting ventilator, on the roof of the car, which was made in such a way that the wind caused by the movement of the train created a suction or a partial vacuum which drew the foul air up out of the car. It was claimed that this ventilator was so efficient that, even when the train was stopped, a slight breeze would create enough suction to cause the system to continue functioning.

The Intercolonial Railway became interested and one coach was equipped with the Hughes system; the work was supervised by D.White, Master Car Builder, and J.H.Wran, foreman of the fitting department. Numerous trial runs were made with officials on board and contemporary reports state that the trials were successful but nothing further was done probably because the officials believed that the results did not warrant the expense. Then, too, the Intercolonial Railway was a government-owned road, with all the evils of government ownership highly developed, and, during the early Nineties, the political atmosphere was in such a disturbed state that officials of the railway perhaps were unwilling to initiate a project which might cause repercussions in parliament, especially when the inventor was a politician of considerable prominence.

The early air-conditioning systems failed mainly because there was no reliable and easily controllable source of power to operate the units and it was only when passenger cars were equipped with individual and independent systems for generating electric power that practical air conditioning became possible.

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