Mechanics.

THE EFFECT OF HIGH SPEED OF ENGINES UPON CONDENSATION OF STEAM.

At the recent meeting of the Master Mechanics' Association, Mr. C. A. Smith, of St. Louis, reported the results of a series of experiments made to ascertain the temperature of steam cylinders during the working of the engine at varying speeds. The apparatus employed in these experiments consisted of a silver tube six inches long, 5 16 inches in diameter outside, and 1 32 inch thick, this tube being closed at one end, and having passed through it a rod connected by a cam and tooth gear to the index of an ordinary pressure gear, the arrangement being such that the expansion and contraction of the silver tube moved the index of the gauge, and so indicated the temperature. The necessary graduations were obtained by the comparison of the instrument with a good thermometer. In using the apparatus it was applied to the cylinder, so that the exterior of the silver tube was exposed to the steam in the cylinder, and when thus applied to the cylinder of an engine working slowly, the index of the instrument showed during each stroke nearly the whole range of temperature to be expected from the variation in the pressure of the steam. At higher speeds, however, the range of action of the index became less. Thus on the 24th of April last the apparatus was applied to a locomotive hauling a light passenger train, the steam being throttled except at the highest speed. The experiments were continued through a run of 33 miles, and it was found that whereas, when the engine was making but 50 revolutions per minute, the instrument indicated a change of temperature of 120° during each stroke ; at 100 revolutions per minute the variation dropped to 60° ; at 200 revolutions to 30° ; and 300 revolutions to 20°, the amount of variation being thus inversely proportional to the speed.

IRON CLAD STEEL—A NEW MANUFACTURE.

The Norway iron works at their rolling mills in South Boston have been working a product of iron and steel lately which is somewhat of a curiosity to iron craftsmen. It is called, after working, iron-clad steel, and, although the process was invented and patented some years ago, it has never yet come into general use. It has always been considered rather difficult to work iron and steel together, to any great extent, on account of the difference between the two metals. Although steel and iron readily unite when they are brought to a proper degree of heat, yet it has always been found rather difficult to properly heat long bars of iron and steel so that they would become firmly welded together under the pressure of rollers. This invention of iron-clad steel, it is claimed, has surmounted the difficulty. The metals are united by a curious process before the rolling commences. A box is made of pig iron or muck bars, with sides, ends, top and bottom complete. Into this box the steel is put, the box is closed, the whole mass is brought to a high degree of heat, and the process of working begins. The iron box inclosing the steel, now in form of a solid mass with the iron and steel united, is worked into the form of a bar and is ready for rolling. This bar two or three inches square, it is claimed, costs three cents a pound. The process of rolling begins, and the steel with the iron outside of it can be rolled down into any size of rod or bar which may be desired. The most curious feature is that the iron and steel keep their places relatively, the iron still outside of the steel, no matter now much it may be worked.

Like the candy maker's plastic sugar when he puts in a lump of different color and draws and molds the two together, each color keeps its place and the stick of candy is produced with a red centre ; so the iron keeps its place outside of the steel in the process of rolling, and the steel is produced with a coating of iron around it varying in thickness according to the relative proportions of iron and steel that were used in making and filling the box at first. As stated above, the process is not a new invention, but from the fact that the invention has laid comparatively idle for some time, it is probable that people interested in the working of iron and steel may have forgotten it, even if ever aware of its existence. The process of manufacture is curious, and several advantages are claimed over the ordinary process of uniting iron and steel by welding. It is claimed that the iron box prevents the decarbonizing of the steel in the process of heating and working. The superintendent of the rolling mills also says that the steel, which fuses at a lower degree of temperature than the iron around it, often bursts out of the iron enclosure in a molten state. It is proposed to put the iron-clad steel to various uses. It is already being made into horse shoes and tested, and it is thought that it may be very useful and available for other purposes. The article is controlled by a patent, and the rolling mills at South Boston produce only a prescribed amount for the company controlling the invention.—*Boston Herald.*

DIRECTIONS FOR LACING RUBBER BELTS.

The belts should be placed on the pulleys as tight as possible. This can be best done by the use of belt clamps, except in the case of very narrow belts. In all cases the belt should be cut about one-eighth of an inch less than the distance around the pulleys with a tape line. The seam of the belt should always be on the outside. For narrow belts, butt the two ends together, make two rows of holes in each end (thus obtaining a double hold), and lace with lace-leather. For wide belts, put, in addition, on the back, a strong piece of leather or rubber, and sew or rivet it to the belt. If the belt should slip, it should be lightly moistened with boiled linseed oil—animal oil will ruin the belt. If one application does not produce the desired result, repeat until it does. The belts will be greatly improved and their durability increased by coating the surface lightly with a composition made of equal parts of black lead and litharge, mixed with boiled linseed oil and Japan enough to cause it to dry quickly ; the effect of this will be to produce a finely polished surface.

Remarkable Welding.—A correspondent of the *Blacksmith and Wheelwright* discourses as follows about welding :—"A great deal has been said about the welding of cast steel, and a great many different receipts for making welding preparations given, but for successful welding in my opinion there is nothing so good as the cherry heat welding compound. I have been a practical blacksmith and tool maker for over 40 years, and have used every receipt that I have seen printed and others that have not been printed, and I have yet to find its equal. If any there are who say to the contrary, I would respectfully say that they do not know how to use it. For the information of such, I desire to state that although it is called cherry heat welding compound and you can weld with it at a very low heat, still I would recommend a borax heat or a little higher, and am satisfied that all blacksmiths using it in this way will be surprised at the results. Some wonderful things have been done with this compound. I will mention one which was exhibited at the American Institute fair, and was pronounced by the *Iron Age*, *Scientific American*, and other papers here and in Europe a wonderful piece of welding. A bar of Bessemer steel, 2 x ½ inches was bent over on itself, some compound put between and welded. The second weld was a piece of cast steel, 2 x ½ inches, welded back of the first weld on the same bar. The third weld on the same bar was a piece of blister steel the same thickness and width. Next a piece of iron same size, and the fifth weld was a piece of cast iron of the same size, 2 x ½ inches. The edge of the bar was then ground and polished and the welds were perfect. Many other remarkable things might be said about the above compound, but I will not encroach on your valuable space further."

Steel joists are being made at a few factories in England and on the continent, but certain difficulties attend the rolling, which as yet prevents their manufacture on a large scale. Steel plates for bridges also are not as yet used to the extent anticipated, and the long span bridges in which their utility is undoubted, do not often occur. In boiler plates the considerable advantages which steel offers are being availed of, and for flanging and other treatment, where high quality Yorkshire iron was used exclusively, steel is, says Messrs. Matheson & Grant in their half-yearly engineering trade report, found to be considerably cheaper, especially for plates of large dimensions.

One Cause of Insanity.—At a recent meeting of German doctors interested in the treatment of insane persons, a paper was read by the director of the Brunswick State Lunatic Asylum, in which he maintained that much of the increase of insanity in Germany is attributable to the excessive amount of work imposed upon pupils in the national schools.

An Emetic for Infants.—A correspondent of the *British Medical Journal* states it as his experience that half a teaspoonful of glycerine acts as a simple and efficient emetic for infants.

Cement for Uniting Leather and Metal.—Wash the metal with hot gelatine ; steep the leather in an infusion of nut-galls (hot) and bring the two together.