

the worst samples in evenness of quality have to stand out, or, in other words, are not allowed to work on the following week, whilst the men who have the least numbers, representing the best samples of work during the week, are rewarded by money prizes. This system necessitates the keeping of surplus men, who are waiting to be taken in when others are turned out. The decision of the foreman when judging the samples is never disputed; the samples are exhibited, so that the men have every opportunity of examining for themselves the work they produce, the figures showing each man's work being posted up daily, so that the men are satisfied that no partiality is shown, no errors of judgment made. This system has been strictly carried out day by day, and every day over many years, and creates a very desirable competition, keeping the men's attention concentrated on their work. The puddler works 10 heats of refined metal of 3 cwt. each per turn.

The puddled balls are all worked under 50-cwt. steam hammers into slabs about 12 by 10 of varying thickness. Each slab bears the puddler's special mark. These slabs are then piled and repiled to make the required weight for rolling into the various sizes of finished iron, whether plates or bars. All these weldings require the greatest care in heating and hammering; the iron bears a very high heat without any deterioration of quality. In plate rolling the greatest care, too, has to be taken to avoid laminations and blisters; the purer the iron the more difficult it seems to be to prevent them. Careful examination is made when rolling by having jets of water playing on the surface of the plates to detect blisters or unwelded portions. The inspection is continued when the plate is cold by rapping all over both surfaces with a hammer and noting the sheared edges all round the plates. The workmen, having inherited their fathers' positions, have done no other work all their lives but manipulate the same class of materials to produce the same results. Only one quality of iron being made, the same methods of working having been pursued over very many years, each workman is especially skilled at his respective task. The result of all this care and skill and good materials is a soft, ductile and reliable iron.

Best Yorkshire iron has attained its high reputation by reason of its power to withstand many sudden shocks without fracture, its reliability and its welding qualities.

#### AN OPENING FOR CANADIAN ENTERPRISE.

An important notice was recently issued by the British Secretary of State for India, which is of special interest to Canadian manufacturers. Rewards are offered by the British Government for the production of designs and models best adapted for mule carts for the transport use of the British Army in India. The awards are to be made after a practical test in India of a full sized specimen by a jury consisting of the Quartermaster-General of the Army of India, and five other military and technical officials. There are five prizes, the first being \$3,750, the second \$2,500, the third \$1,875, the fourth \$1,250 and the fifth \$625. The object desired by this competition is the production of a design, accompanied in all cases by the working model, for a military transport cart adapted to conditions which make the use of interchangeable metal parts for all important portions of the cart absolutely indispensable. Intending competitors wishing for the fullest

details as to the kind of cart required are directed to apply to the Director-General of Stores, India Office, Westminster, London, S. W., England, or to the Secretary of the Government of India Military Department, Calcutta, British India. Foreign competitors may obtain further information on application to the Secretaries of British Embassies or Legations at their respective capitals, but are recommended to apply to London or Calcutta. The competition closes on Sept. 30, 1893, by which time all designs and models must have reached Calcutta, which is twenty-four days from London.

One of the main sources of trouble in British military operations in Asia has always been transportation, and on several occasions important strategical movements have been rendered nugatory by the failure of the transport service. This is true not only of special campaign work beyond the Indian frontier, but also of operations in India itself. The character of the country to be contended with is plainly suggested by the explicit details given as to the construction of the vehicles in the Government notice. The object is evidently to design a military transport cart for a mountainous country, with absolutely no local resources in the way of skilled labor or constructive material. It must be equal to the roughest handling, as the existing unmetalled roads in India are steep, narrow and rough. Although throughout the Indian empire there are many good roads, there are whole kingdoms without a yard of macadamized road. It is apparently with a view to opening out new lines of travel that the authorities propose to strengthen their transport facilities, as the "instructions" set forth that "carts would further be largely employed on unbridged and unmetalled tracks newly opened along hill sides and stony river beds to meet the exigencies of military operations." The carts are to be made almost entirely of metal. As the effects of rough handling and jolting on loose joints and fittings, and bad workmanship generally, combined with the difficulty of making efficient and timely repairs, have in times past been found to be the main causes of transport carts breaking down, machine boring and turning with perfect fit and interchangeability of parts is absolutely insisted on, so that every broken part in any cart can be immediately replaced by a similar part, without any shaping, fitting or skilled labor whatever. The necessity of this restriction as to material is peremptory when the abnormally dry air, the scorching sun, the freezing winds, and the frequent variations in temperature of from 185° above to 15° below zero (Fahrenheit) are taken into consideration. No matter how well seasoned wood may be, it shrinks and warps in such a way that its use, except, perhaps in the poles and shafts, floor boards and sides, is absolutely debarred. A side light on the thieving propensities of the native laborer and camp follower is derived from the strong injunction to dispense with wood, even in the secondary parts, "as it is liable to be stolen and burnt as fuel."

While no restrictions are placed upon the use of any metals whatever, designers are warned that for such parts as tires, forgings, boxes, etc., which it may require specially-skilled labor to manipulate without injury from over-heating or burning, mild steel, wrought, cast and malleable cast iron, copper and brass are preferable to special qualities of steel, phosphorus and Uchatius bronze, and are, moreover, more familiar to native workmen. As the merits of a design will be largely judged from its prime cost, competitors are recommended to consider how far light and strong, but possibly