

are given. All of these have a section index and can be ordered by it from any mill in the Association, which will aim both to keep them in stock and to roll them specially more promptly than any special sizes.

### HORSE HAULAGE.

At a meeting of the Society of Engineers, held at the Royal United Service Institution, Whitehall, on the 2nd inst., Mr. S. Herbert Cox, president, in the chair, a paper was read by Mr. T. H. Brigg, on "The Mechanics of Horse Haulage," a subject which has importance for contractors.

The author pointed out that it was well known, first, that it is easier for a horse to draw a two-wheeled cart up a hill if the load be put forward; and, secondly, that on the level or going downhill the load should be placed at the back. The principle involved in the first case is, that a horse can pull and exercise his force better when the weight is applied so as to hold him more firmly to the ground; whilst in the second case, when a horse does not require to exert much force to keep the load in motion, he should be relieved of all the burden possible, and even himself be partially carried, in order to save his legs both from physical exertion and percussion, thus enabling him to travel further and easier. This moving of the load to and fro has been practised with two wheelers of every description ever since the time when Roman charioteers stood backward or forward in their chariots as they travelled up and down hill. Exactly the same principles, only to a greater extent, apply to horses drawing four-wheeled waggons, &c., with their heavier loads, though perhaps the application of the principles is not so obvious to the ordinary observer as in the case of two-wheeled vehicles. The author explained that his system of attaching draught animals to vehicles is one which automatically confers those mechanical conditions which enable them to do the most work at the least cost. In a perfectly simple manner the shafts of both two and four-wheeled vehicles are made to constitute the necessary mechanical levers, which are so actuated by the horse's own pull, and by an automatic upward lift, that at one time the horse makes himself equal to a much bigger and heavier horse, therefore can pull a bigger load, whilst at other times he is equal to a strong but lighter horse, thus able to move along with ease and comfort. The acting and co-acting forces are effective in causing the wheels at certain convenient times to ease the horse by carrying a part of his weight, whereas at other times when climbing hills and starting loads, &c., the horse is enabled automatically to transfer such a proportion

of the load to his own body as the condition of the road may require. In this way his feet not only obtain a better grip upon the ground, but his body gains a two-fold mechanical advantage over his load. With the new system there is no possibility of the horse having to carry a load downhill or on level ground, as with the old system. The horse will maintain a good and sprightly action over a greater period of time, because the attachment avoids needless hammering of his legs and feet, thus causing him less pain, less exhaustion, and giving the animal greater speed and power of endurance. By the Brigg attachment the author showed that the horse's useful life is in many cases more than doubled, for he is not hampered on good roads by having to carry any portion of the load or vehicle, but the reverse; thus his energy, his legs and his feet are effectively and profitably preserved, and the author claims that it practically gives a new life to old horses.

The municipal corporation of the county of Essex have made application to the Ontario Crown-Lands Department for patents of two town lots on Bedford and Peter streets, in the town of Sandwich, on which are erected the county gaol, court

house and registry office. The buildings have been for many years standing where they are, and their total value is \$65,000 or \$70,000. Only recently they discovered that the site belonged to the Ontario Government.

Electric cranes, operated by the circuits supplying power and light, are used at the Sandycroft foundry in England. A novel feature is the addition of electromagnets to such cranes for readily lifting pieces of iron and steel, one magnet, excited by  $5\frac{1}{2}$  amperes at 110 volts, being capable of supporting any weight up to two tons. So great a labor saver is this magnetic crane, it is stated, that three men now do in 15 minutes work that which formerly kept six men busy for an hour and a half.

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