The Value of the Coefficient of Expansion.

An illustration of the way in which a coefficient like 0·000006, that of the expansion of steel, may become a big thing with a few degrees of rise of temperature and long lengths has been seen, says the *Engineer*, on the new Midland line between Irchester and Sharnbrook, recently opened for goods traffic. The rails were laid during winter time, and insufficient room was left for expansion, consequently the summer heat expanded the rails to such an extent that the road burst out of line. Traffic had to be at once stopped and the permanent way altered and properly spaced. Accidents from the "spreading" of rails are far more frequent that is supposed on roads in this country. Your compiler long ago showed the vital necessity of regulating the space allowed for expansion at the ends of rails by constant reference to the height of the thermometer on the spot and during the whole process of laying the rails.

CLAW BAR.

The square face-plate of hardened steel has its corners bent upward, rounded, and recessed to form claws for receiving the body and head of a spike; the under side is slightly convexed to fit snugly upon the curved upper side of the bar, to which it is united by means of a pivot bolt and nut. The bar is formed substantially the same as an ordinary claw bar for drawing railroad spikes, with a recess in the end for the body of the spike. Through the bar, directly in the rear of the pivot bolt, is a hole, through which is passed a bolt whose head rests in one of the claw recesses of the face-plate; the under side of the bar is rabbeted to form a bearing for the nut. If the claws which are in use should break, by removing the rear bolt another pair of jaws may be brought over the recess in the bar. The recesses in the face plate may be of different widths to adapt the bar to spikes of different sizes.

It is evident that this claw bar will wear four times as long as the ordinary bar, and by renewing the worn-out plate

HARDWICK'S CLAW BAR.

can be quickly refitted for use; and as the plate can be more nicely finished and better tempered than the end of the common bar, still greater durability is insured.

This invention has been patented by Mr. James L. Hardwick, lock box 569, Cedar Rapids, Iowa.

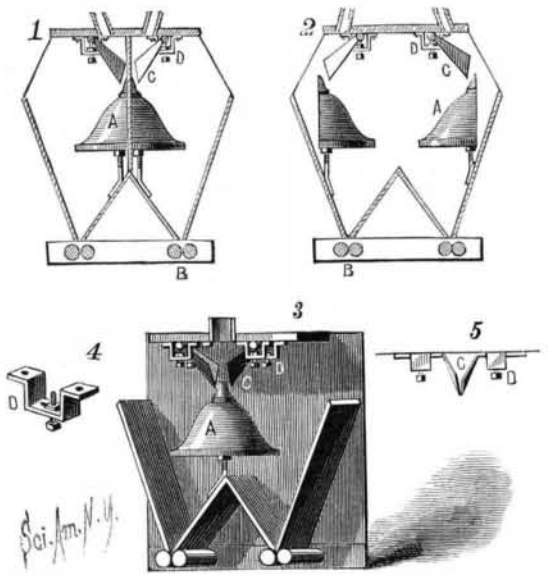
Bessemer Steel Works in the United States.

There are 21 Bessemer steel works in the United States and 1 in process of building. These 21 works contain 46 converters, and 3 converters are building. The total annual capacity of the works completed is 2,490,000 net tons of ingots. The plant building is that of the Benwood Iron Works, a-Benwood, W. Va. The States that have Bessemer works are: Massachusetts, one, with two 4 ton converters; New York, one, with two 7 ton converters; Pennsylvania, nine, with twenty-two converters, and one building, ranging in size from 2 ton to 10 ton; West Virginia, one, with two 5 ton converters, and one building, which will have two 4 ton converters; Ohio, three, with five converters, ranging in size from 4 ton to 10 ton; Illinois, four, with nine converters, ranging from 6 ton to 10 ton; Missouri, one, with two 7 ton converters; Colorado, one, with two 5 ton converters.

The first Bessemer plant in the United States was erected in Troy, N. Y., and made its first blow February 15 1865; the second was erected at Steelton, Pa., and made its first blow June, 1867; the third was erected in Cleveland, Ohio, which made its first blow October 15, 1868. The largest Bessemer plant in the United States is that at Steelton, Pa., which contains two 7 ton and three 8 ton converters. The next largest are the Edgar Thomson, at Pittsburg, and the North Chicago, at Chicago, which have three 10 ton converters. The domestic works are now more than able to supply all domestic demands for Bessemer steel, and one of them recently received a 10,000 ton order from Canada for rails.

FEED MECHANISM FOR ROLLER MILLS.

The engravings illustrate a feeding device for roller mills, patented by Mr. Julius Busch, of Marine, Ill., which will deliver the material evenly to the rolls. The material is directed to the grinding rolls, B, by cant boards. Adjustably supported from the cant boards or the sides of the hopper by a threaded rod having an adjusting nut is a half-bell shaped



BUSCH'S FEED MECHANISM FOR ROLLER MILLS.

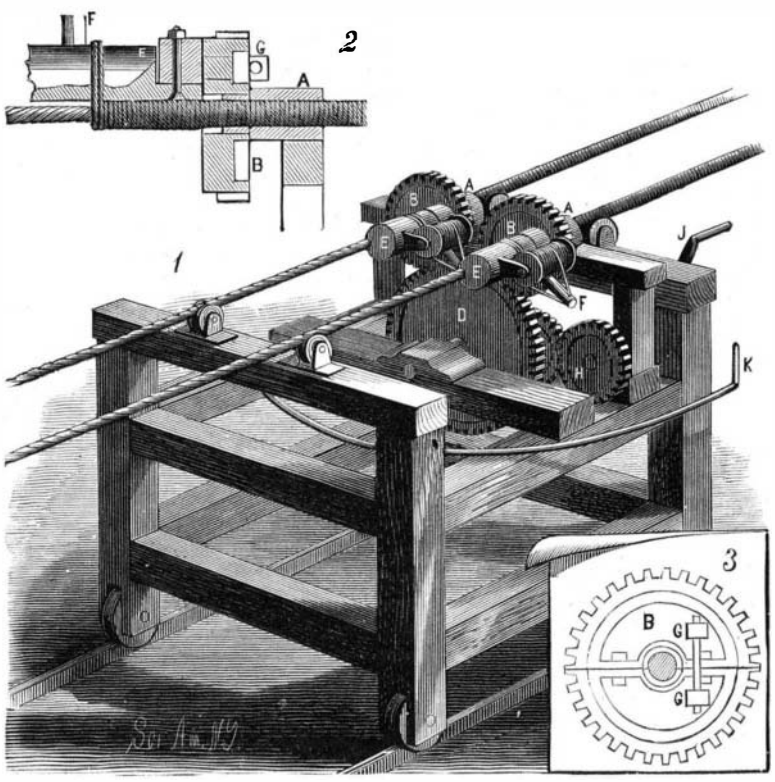
distributer, A, as shown in Figs. 1 and 2; or as shown in Fig. 3, two of these distributers may be combined. Fixed to a rod supported within slotted brackets, D, is an inclined spout, C, the lower end of which is directly over, or nearly over, the apex of the distributer upon which the material is delivered. The rod is prevented from turning by the action of screws and nuts resting upon the bottom of the brackets, the inclination of the spout, to deliver the material higher or lower, having been previously affected. The slots in the brackets permit of the lateral adjustment of the rod to admit of the lower end of the spout being located farther from or nearer to the distributer, according as the end of the spout is raised or lowered. A smaller distributer may be placed upon the apex of the large one when fine, soft material is being fed to the rolls; two of these may be united for use with the distributer, A, Fig. 3. Material is fed to the hopper through delivery spouts. For coarse, sharp middlings the distributer, A, only will be needed. The middlings from the spout, C, striking upon the curved face of the distributer, will be spread in a thin, even stream, which, falling upon the side of the hopper or the cant board, will be delivered in an even stream to the rolls. For fine, soft middlings the smaller distributer may be placed upon the apex of the other, and the spout so adjusted as to deliver near the upper apex.

ROPE SERVING MACHINE.

The frames are supported upon wheels adapted to run on suitable rails for moving the machine along the ropes that are arranged in guides, A, on the top beam. Mounted on each guide is a toothed wheel, B, which is geared with a master wheel, D, operated from a crank, J. Each of the wheels, B, carries a boss extending a short distance from the side parallel with the rope to which the tension device, E—called by the inventor a "mallet"—is pivoted to bear on the rope. This device (Fig. 2 is a section of one of the guides and tension devices, and Fig. 3 shows a tension device and reel carrier divided in two parts and bolted together to facilitate the rigging of the machine to the ropes) consists of a cylindrical block of wood of considerably larger diameter than the rope, and having a groove along the side next to the rope, in which the rope is made to bear by the yarn which, in passing from the spools, F, is carried around the mallet and the rope a couple of turns, first passing through an eye in an arm projecting from the mallet. The spools are pivoted in arms projecting from the mallet and from the boss, so that the spools and mallets are carried around the ropes.

The guides are made in two parts, the upper of which may be taken off to facilitate the adjusting of the ropes, and the wheels, B, are also divided for the same purpose. To enable the attendant to turn the winding wheels while walking by the side of the machine, and also to enable the crank to be applied so as not to be interfered with by the ropes, the train of wheels, H, is geared with a wheel on the shaft of the master wheel, D, the crank being applied to the shaft, H. The machine will naturally feed along by the pressure of the coils laid on the ropes against the yarn being laid on; but it will need to be pushed to some extent by the attendant, and the push rod, K, is so arranged that the force is applied at the middle of the front end; the rod extends back, so that the operator can push the machine with the left hand while turning the crank with the right.

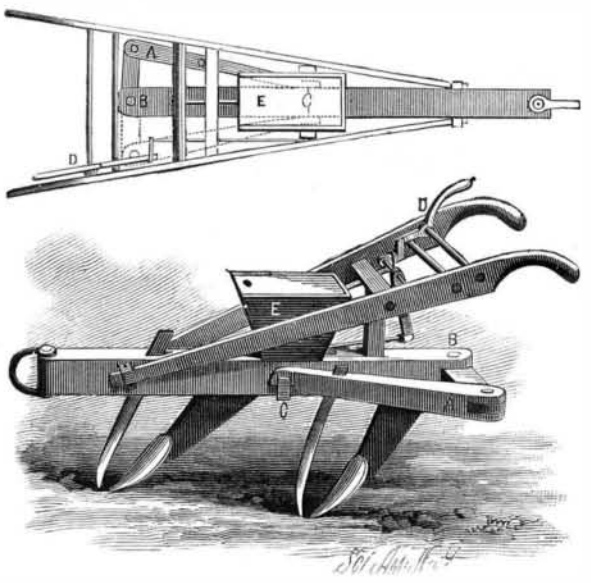
Further particulars regarding this machine may be obtained by addressing the inventor, Mr. Archibald McQuarrie, Post Office, Buffalo, N. Y.



McQUARRIE'S ROPE SERVING MACHINE.

AN IMPROVED PLOW.

The accompanying engraving shows a plow which, although suitable for use on level ground and as a cultivator after planting, is more particularly intended to be used as a sidehill corn planter. The inner plow beam carries, near its forward end, a share secured to a standard, and a colter. The corn hopper, E, is provided with a slide operated from the handle, D, by means of intermediate connecting rods and levers. A supplementary plow beam, A, carries a share, standard, and colter similar to those on the main beam.



STEVENSON'S IMPROVED PLOW.

This plow beam is arranged to lie to one side of the rear portion of the main beam, as shown by the full lines in both cuts, or to either side of the main beam, as shown by the full and dotted lines in the plan view, to do the hill-side or special work required of the plow and planter. To accomplish this purpose the beam is fitted to turn horizontally from the rear end of the main beam to opposite sides of the latter. The ends of both beams are slotted and connected by a link pivoted at each end. When the beam, A, is swung to a position in line with the main beam, its share and colter face in a reverse direction to the forward share and colter; but when it is swung to either side, the shares and colters face in the same direction with the rear ones to one side of those forward. The movable beam is held in place by a tooth on its free end, engaging with a latch, C, on either side of the main beam. A very important advantage of this combined plow and planter is that the share on the beam, A, may always be located on the upper side of the hill when at work, to operate as a covering shovel.

This invention has been patented by Mr. James N. Stevenson, of Salvisa, Ky.

Petrified Wood.

The petrified wood which is so abundant in Arizona, Wyoming, and Rocky Mountain regions, is utilized in San Francisco, where there is now a factory for cutting and polishing these petrifactions into mantelpieces, tiles, tablets, and other architectural parts for which marble or slate is commonly used. Petrified wood is said to be susceptible of a finer polish than marble or even onyx, the latter of which it is driving from the market. The raw material employed comes mostly from the forests of petrified wood along the line of the Atlantic and Pacific Railway. Geologists will regret the destruction of such interesting primeval remains, and some steps ought to be taken to preserve certain tracts in their original state.